

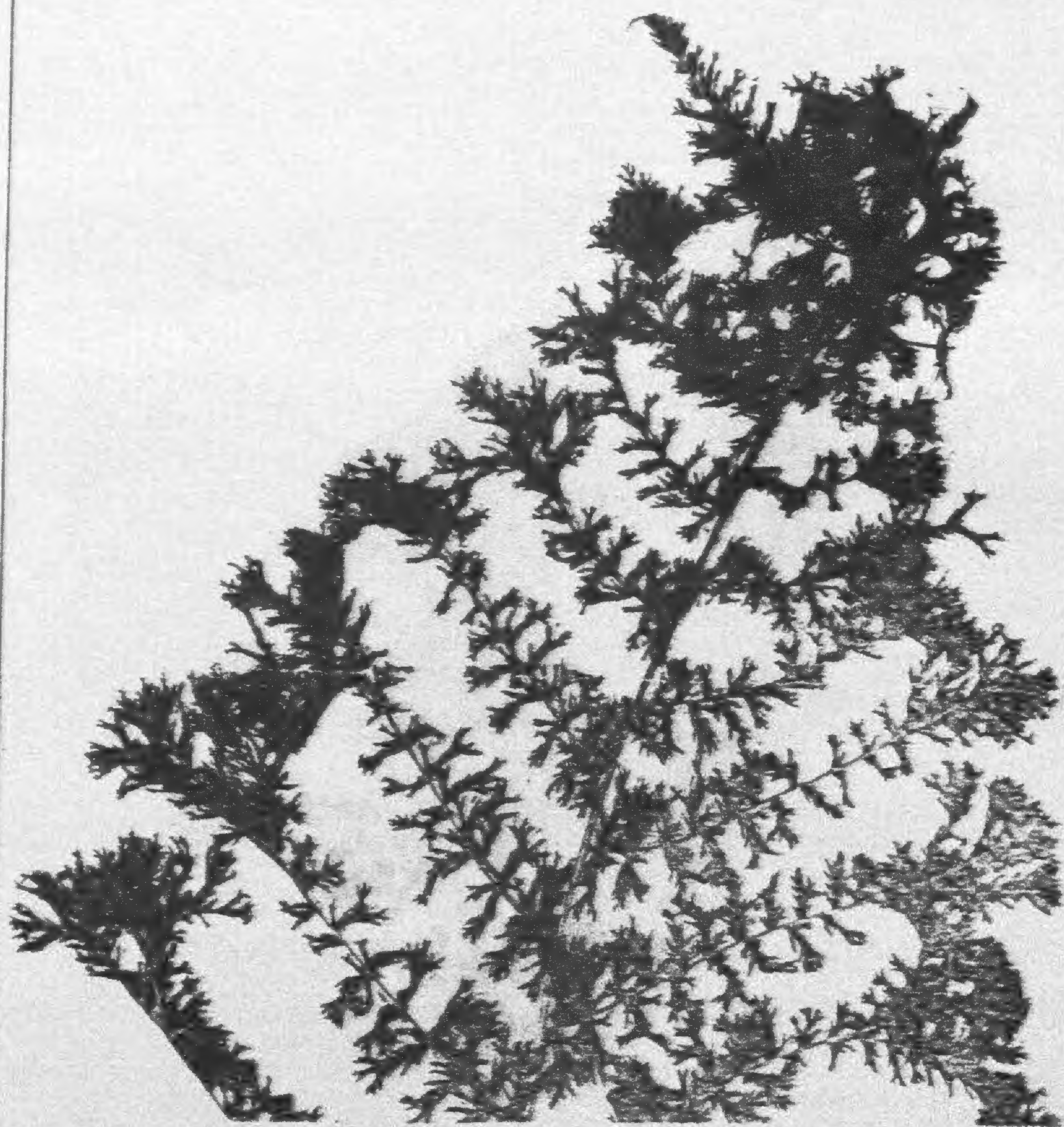
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SOCIETY

PTERIDOLOGIST

Edited by
M.H. Rickard



THE BRITISH PTERIDOLOGICAL SOCIETY

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The BRITISH PTERIDOLOGICAL SOCIETY was founded in 1891 and today continues as a focus for fern enthusiasts. It provides a wide range of information about ferns through the medium of its publications and available literature. It also organises formal talks, informal discussions, field meetings, garden visits, plant exchanges, a spore exchange scheme and fern book sales. The Society has a wide membership which includes gardeners, nurserymen and botanists, both amateur and professional. 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*, Society business and meetings reports.

Membership is open to all interested in ferns and fern-allies. **SUBSCRIPTION RATES** (due on 1st January each year) are Full Personal Members £10, Personal Members not receiving the *Fern Gazette* £7.50, Student Members £5, Subscribing Institutions £20. Family membership in any category is an additional £2. Applications for membership should be sent to the Assistant Secretary (address above) from whom further details can be obtained. (Remittances made in currencies other than sterling are £1.50 extra to cover bank conversion charges). Airmail postage for all journals - an extra £3.50, or for those not receiving the *Fern Gazette* £2.50.

(Front cover *Athyrium filix-femina* (*Setigero-percristatum* group) 'Majestic' x 1/2)

Back numbers of the *Gazette*, *Pteridologist* and *Bulletin* are available for purchase from P.J. Acock, 13 Star Lane, St. Mary Cray, Kent BR5 3LJ, from whom further details can be obtained.

JUL 24 1990

FERNS ON THE MENU**BRIDGET GRAHAM***Polpey, Par, Cornwall PL24 2TW*

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What is man? A question debated variously by theologians, philosophers, biologists, anthropologists, and also chemists, who have assured us that we are a sophisticated system of compatible chemicals. Again, there is another group who teach we are co-ordinated electrical impulses. Some would have us believe that we are the sum total of what we eat. Are vegetarians less aggressive than carnivores? What is the link between fast food and the increase in mugging? How do we relate to the image of the ferocious pre-historic tribes, the contents of whose stomachs appear to have been largely seeds and berries? At what fearful and agonising cost did experiment and experience discover the edible from the deadly, the delicious from the colic-inducing vegetation which grew on their territory?

Obviously the major successes, such as grains, fruits, roots and green vegetables were recognised and subsequently cultivated. They remain the staple diet of twentieth century mankind. Others have slipped into oblivion, appreciated only by the less sophisticated and less accessible countries, and by a small number of gourmets. Among the forgotten sources of nutrition are the ferns.

At the present time the media has focused the spotlight of publicity on every possible aspect of diet. The bewildered and unsettled British public might turn gratefully to 'greens' which have no preservatives, and are raised without cruelty or exploitation. Moreover, they have behind them venerable, historical records of great antiquity over most of the globe.

There is only one overall requirement on the part of the home-caterer to introduce ferns into the family menu, that is initiative. Initiative to collect your raw product, initiative to serve it as an appetising dish, and initiative with which to inspire confidence among those assembled for the meal.

For those who believe there is more nourishment in food eaten raw, the *Encyclopaedia of Ferns* (Jones, 1987) lists five species from which to choose. They are

Drynaria rigidula - grown and eaten in Celebes

Cerapteris thalictroides

Helminthostachys zeylanica

Stenochlaena palustris

Diplazium esculentum.

This last fern is especially enjoyed in the Philippines. Such dignified names would be impressive on any menu, but a warning might be added in small print that whereas the young croziers are crisp, as they mature, they develop a mucilaginous texture. Chewing the cud is a prolonged operation. Few people today have the time to linger over meals. The careful cook might play safe by serving them softened up. Either way the impact would be sensational.

Equisetum arvense is listed among the fern allies that are said to taste of asparagus, if lightly boiled or steamed. The preparation is simple. The best results are from the young fiddleheads, which are washed, and then all the scales and hairs removed. Either steamed or boiled, the water should be salted, the fiddleheads can be either whole, or sliced like runner beans. The time given is from 30 to 60 minutes, until they are "soft enough to eat". The conscientious cook will not leave this to chance, but taste for texture at intervals, since the time-range is considerable. That would depend, of course, on the toughness of the ferns, and whether they were boiled or steamed, and whether intended to be served as asparagus or spinach. Melted butter might be a good accompaniment. Perhaps there is a recipe book available in the U.S.A.? A pamphlet

has been published by the Food and Nutrition Branch of Agriculture and Rural Development of New Brunswick. One dish is made with stir-fried chicken. I assume, therefore, it has the stamp of official approval.

The nourishment stored in ferns is for the benefit of the plant, but it is in a form of starch digestible by man, very rich in carbohydrates. Although modern diets reduce the intake of starch to a minimum, it is, after all, a principle source of energy, and is necessary to maintain a reasonable standard of health in man, animals and vegetables.

It was predictable that prehistoric man should have discovered that the tree-ferns offered a source of food. With primitive axes or knives, slices were shaved off the caudex, skilled work for the hunter-gatherers who wandered through the primeval forests.

The Encyclopaedia lists the tree-ferns still included in the diet of the less sophisticated peoples today.

<i>Cyathea spinulosa</i>	parts of India
<i>C. medullaris</i>	New Zealand
<i>C. canaliculata</i>	Madagascar
<i>C. contaminans</i>	New Guinea and the Philippines
<i>C. australis</i>	Australia
<i>C. viellardii</i>	New Caledonia
<i>Cibotium chamissoi</i>	Hawaii
<i>Dicksonia antarctica</i>	Australia

In the parts of New Guinea where cannibalism is still the norm, several species of ferns are believed to be eaten in the mountainous districts. The Encyclopaedia is careful to point out that "details are lacking", but we do know that it is the upper part of the trunk that is collected, and either boiled or roasted. The same procedure must be followed for the meat course. Whether the ferns are cooked separately, or braised in the pot around the joint of flesh from some four or two-legged game must remain a matter of conjecture for me, at least until I hear a traveller's tale from some intrepid explorer.

Species of *Angiopteris* and *Marattia* were popular with a number of ethnic groups. The large, fleshy stems of *A. evicta* were roasted and eaten as a vegetable in the Pacific Islands. The Maoris cultivated *Marattia salicina* around their villages. In many tropical countries the rhizomes of *Blechnum indicum* were collected where it grew abundantly in swamps. The aborigines of Australia prepared it by roasting. In general, this seems to be a more popular method than boiling, and would, I imagine, be more tasty. Several familiar species are still part of the diet of isolated peoples. In North America, *Dryopteris campyloptera* is cooked by the Indians. In Alaska, the Eskimos supplement their diet of whale blubber with boiled rhizomes of *D. carthusiana*. The rhizomes of several other ferns are recorded as edible, mostly strange to Europeans, but among the familiar is *Polypodium vulgare*. Some carry a word of caution. *Drynaria quercifolia* is collected only in times of famine. Food for thought there. *Nephrolepis cordifolia* has little fleshy tubers on its roots, they are scaly, and said to be as appetising as new potatoes. But they are only eaten in Nepal, and that after roasting. I have seen *N. cordifolia* 'Compacta' growing on dry stone walls on the island of Nevis in the Caribbean. It is a most attractive fern, but conscience forbade me to dig it up to look for the tubers, although there would have been a chance to roast them along with the lobsters at the barbeques on a palm-fringed beach, washed down with jugs of wine.

Plants and man must both adapt to long droughts in Australia. *Marsilea drummondii* flourishes in the rainy season, but as the ground dries out so does the fern, leaving a mass of hard, woody sporocarps at the base of the withered fronds. These are picked by the thrifty aborigines, ground into a yellowish flour, and then baked into cakes. There is a note here, to the effect that the natives found them "good fare",

but that white men forced to live on them were "poorly nourished".

Nor were ferns ignored in Europe, although the taste for them is localised. In Norway *Dryopteris filix-mas* is cooked and served from choice, not merely because of its anthelmintic properties. A few species of ferns can be used as an alternative to tea. In California the favourites are *Pellaea ornothopus* and *P. murconata*, which is aromatic. Our native *Blechnum spicant* is another. More popular in Europe is *Dryopteris fragrans*, but the most generally preferred across the globe is *Adiantum capillus-veneris*. As members who have read *Ferns in Medicine* (Graham, 1989) may remember, maidenhair is well endowed with medicinal properties. Two pots, at least, of this valuable fern should be in every household. Should you feel bold enough to make an intoxicating drink, try fermenting the starchy caudex of one of the *Angiopteris* species, or, if you brew your own beer, experiment by using bracken instead of hops; it is claimed that the flavour is distinctive.

Pteridium aquilinum, (*P. esculentum*), along with the wolf and the snake, had a bad name long before the media focussed its insensitive curiosity in that direction. T.V. nature programmes have presented the wolf and the snake in a more kindly light, but the bracken has incurred a very bad press. In spite of being known to contain carcinogenic properties it is still eaten in several countries. In New Zealand the bracken is first soaked, and then pounded until a starchy powder is obtained. The end product is like arrowroot, and the Maoris make it up into a dough, and bake into something like bread.

Bracken is also included in the diet of the Filipinos, but whereas in these two countries mashed bracken might be a necessity, it is not in Japan and the N. American continent. I have no statistics of the incidence of cancer in either country, but I have read that it is abnormally high in Japan. I have seen photographs of two brands of canned fiddleheads (see opposite page 8), one by a firm called McCain, and the other, Belle of Maine. I think they are Canadian products, but *Fiddleheads* is not specific. Most likely they contain the Shuttlecock/Ostrich feather fern. It would be no harm to open a tin, IF they are on sale over here, and inspect the contents.

My closest encounter with bracken was sharp, painful and harmless. I cut my finger very badly indeed, by stupidly trying to break a tall frond. The blood poured out in such quantity that I laid a trail back to the car, which aroused the curiosity (or was it compassion?) of a passing samaritan who came to see what was going on. The wound healed by first intention, and was exceptionally healthy. I have no first-hand experience of tasting bracken, but an authentic second-hand account. An eminent entomologist who is a close friend told me that he and his wife once ate bracken during the Second World War. He described it as 'not very nice', and said that it left him with a dry mouth and slightly sore throat for a few days. His wife was more emphatic; she said it was horrible, her throat was very sore, and that she felt sick. Both were very thirsty and both agreed they would not repeat the experiment. BUT, neither had any lasting effects, and both are in good health fifty years later.

Stella Maris Turk (Turk, 1989), whom I know personally to be well qualified to voice her views, wrote of the extreme danger to man or beast coming into contact with bracken. She quoted *Poisonous Plants in Britain, and their effects on Animals and Man*, published by the Ministry of Agriculture, Fisheries & Food as having stated that some toxic qualities persist in the fern, even after cutting and drying. Her advice is to avoid it at all costs, and control it by an annual cull before the spores ripen in early June.

Dr Elizabeth Sheffield of the University of Manchester replied to Mrs Turk (Sheffield, 1990). She confirmed that *Matteuccia struthiopteris* is edible, and agreed that bracken was dangerous, but that the tests of the Ostrich fern had shown it to be free of carcinogens.

In a letter, Dr W. Trotter (Trotter, 1990) quotes the evidence of Dr Antice Evans of the University College of North Wales in 1965, that various animals known to feed on bracken

developed an abnormally high incidence of tumours, including leukaemias. Researchers in other countries agreed with this, while yet again pointing to the high rate of stomach cancers in Japan among those who enjoy the young shoots as a delicacy. Dr Trotter writes that there is plenty of bracken in his own garden, and ponders that his wife and gardener both died of cancer, and that both handled bracken regularly for winter mulching. He does point out how variable is the vulnerability of species, animal, vegetable and human, to carcinogens and suggests the same method of limiting the risk of infection as Mrs Turk, that is by cutting down the bracken before the ripening of the spores. He adds that the reapers have been advised to wear masks as they set about their hazardous work. He also admits that he has not yet eradicated *Pteridium* from his own garden.

I cannot think that a plant which covers such great areas of land, in so many continents, can be lethal to man and beast. At least, the danger cannot be compared to aerosols, toxic waste, pollution by chemicals and sewage, or the felling of the tropical forests. If these precious trees are decimated, it is an invitation to plants, such as bracken, to take over. Man has never mastered his environment, but it should not be beyond him to work out an ecological balance of live and let live. The answer to the world's problems must lie in the search for a viable constant, wherein the scales are held in a perfect equilibrium. It is the vision of Being, benign and timeless. Today men seem aggrieved to discover that nature is not slanted to make their lives cosy and free of risk.

I hope I have stirred the enterprise and curiosity of even the most conservative members to seek new epicurean delights. If I could choose but one such experience, it would be to join a party of plant-hunters in the high Himalaya, where Moonwort is cooked on the open camp fires, to listen to the Sherpa's tales, and from them learn a little more about the imponderables of Life. The atmosphere would be propitious to the sighting of an Abominable Snowman.

There is much evidence today on the importance of widening our horizons, scarcely less on a healthy diet. Here is an opportunity for the British Pteridological Society to become a trend-setter. Ancient peoples have fed on ferns over the millennia and survived. It remains for us to endorse or reject their customs.

Bon appétit - at the consumer's RISK!

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NOTES FOR CONTRIBUTORS

Please send articles, notes and reviews for publication to the Editor (address inside front cover). Material should ideally be typed and not longer than 2500 words, or the equivalent of 4 sides in print. Please follow the style of this issue.

The deadline for copy is the 31st of December each year.

THE BPS SPORE EXCHANGE

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The title SPORE EXCHANGE is misleading. Although it may have been originally conceived as a scheme for exchanging spores (and also for exchanging plants, a plan which has only recently become operational), in practice it is a spore distribution service. The spores are donated by about 30 different people but over 100 people request spores. There is, however, an important difference between our Spore Exchange and the seed distributions offered by sister organisations such as the Alpine Garden Society, Hardy Plant Society, etc. These schemes operate in early winter with a finite date for applications each year and at the end of the season they dispose of all surplus seed. The Spore Exchange, on the other hand, operates throughout the whole year, the spores being held as a spore bank, although the main bulk of requests are received in the early spring after the publication of the new list. Spores are also received throughout the year, not just in the autumn, and are kept for 2 to 3 years if they are of tropical origin and 3 to 4 years if they are British native species or cultivars. Fresh spores are despatched whenever possible, but not all items are received every year. Spores requested from Botanic Garden seed lists are often a year old by the time they reach members. However many spores are only available through these sources, and the Society is extremely grateful for the opportunity to try items not available otherwise, being regarded as a worthy recipient of scientific material.

The Exchange was started in 1972 by David Russell. Richard Cartwright took over shortly afterwards and built it up to its present size until he retired from the job three years ago. It is now probably the largest list of spores on offer in the world. This vast list is only made possible by the small body of members who give most generously. About 15 British members contribute regularly. Otherwise, spores are received from half a dozen European botanic gardens (none British) and from overseas members living in Europe, America, South Africa and Australia. The Australians are particularly generous with very large quantities coming from Mike Young at Mount Lofty Botanic Gardens and, this year, from Roy and Yvonne Kalmo who have taken over the running of the S. Australia Fern Society Spore List. New sources are being continually sought, particularly of anything new, rare or unusual. If members are seeking particular ferns not listed, it is sometimes possible to acquire them by diligent search. A recent development with the encouragement of the National Council for the Conservation of Plants and Gardens (NCCPG) has been the establishment of National Collections of ferns in Britain. Collection holders are making use of the Spore Exchange and in future it is hoped they will be a good reliable source of supply. Another possible source are plant expeditions to the wild, but unless the spores are collected by pteridologists the results can be disappointing. Please could our members who are going on such trips remember the Spore Exchange. Any surplus will be gratefully received and it would also be possible to operate a scheme to monitor the results of trying to raise new introductions.

The most requested ferns are small hardy species, especially woodsias. *Adiantum monochlamys* and *A. renforme* are also current favourites. There also seems to be a steady interest in ferns for the alpine house, such as *Cheilanthes*. Other foreign species likely to be hardy are popular, as are good varieties of British natives, and there is a steady demand for tree-ferns from both overseas and British members, especially the uncommon kinds.

The spores arrive in a variety of different packaging materials – from tiny plastic capsules of pure spores to large 'botanical envelopes' made from scrap exercise paper, (interesting reading, no doubt, if one had the time!), containing whole fronds. It really doesn't matter how they come provided the packages don't leak en route. One member has sent beautiful

clean spores in tobacco paper which is actually quite a good material to handle. Overall the best packaging is the 'botanical envelope' which has the versatility of being made to any size and out of any paper, although a reasonable quality writing or airmail paper is optimal. (If any member would like to learn how to construct these envelopes please write to the Spore Exchange Organiser).

Spores are repackaged for distribution into glassine self-seal envelopes which are convenient to use but have one major drawback. Tiny amounts of spores can be lost by adhering to the self seal gum. However, it is hoped that this problem has been overcome by enclosing them in a slip of airmail paper inside the self-seal envelope. Recipients should cut the tops off the envelopes they receive before sowing, rather than opening the self-seal and losing the spores to the gum.

Luckily, unlike the equivalent amount of seed which would require a large filing cabinet, the spores can be stored in six 4" by 12" boxes. Many spores remain viable for a considerable period of time; refrigeration should prolong their life. Some spores are of such short viability that they are not included on the list. Matt Busby sends out *Osmunda* spores, when fresh, directly to members. This service could be extended to other species where viability is a problem, but it would need definite offers from donors. This year, *Todea barbara* has been sent as fresh green spores from overseas for immediate sowing.

Each autumn the major task is to compile the new list. This is now done with the help of a computer. The list is sent to two experts to check the names for spelling, synonyms and authenticity. The naming of plants, whether ferns or not, always causes problems and disputes. However, it is very important that the spore list should, as far as possible, have the correct up-to-date names as it is seen by all major fern growers and many botanists. Last year, for the first time, the botanical authorities for the names used on the list were available to members. However, ferns seem to be particularly prone to name changes which confuse the amateur who has only just come to grips with one name when confronted with a quite different one. There is one item on the list which has appeared under a different name each time for the past three years! This list is produced primarily to encourage people to grow ferns. It is hoped that more information could be made available to members on synonyms and name changes in a handy form. Richard Rush's *Guide to Hardy Ferns* is very useful in this respect, but a similar guide to tropical and sub-tropical species is needed. Another problem is that taxonomic lumpers are at work - taxa that are at least horticulturally distinct may be submerged into one loose species. This is a great pity from the gardeners' point of view and in such cases perhaps some kind of distinct name could be retained.

Peter Barnes wrote in the *Pteridologist* (The Horticultural Nomenclature of Ferns, *Pteridologist*, Volume 1, Part 5, 1988) proposing a new system of names for British fern cultivars to bring them into line with the International Code of Nomenclature for Cultivated Plants (ICNCP). If implemented, this would bring a totally new look to the list. *The Plant Finder*, published by the Hardy Plant Society, has already partially adopted this system, but its application appears somewhat arbitrary. It is noted that Chris Philip and Tony Lord, the editors of *The Plant Finder*, hope that the BPS will follow suit.

However, when all this is said and done, what the recipient requires is that the spores should be accurately named. Unfortunately, this cannot be guaranteed, as the reliability of the names is only as good as the donor's knowledge; the spores are received in good faith that they are what they purport to be. It is to be hoped that the majority of spores have been correctly identified, although even the most august institutions have been known to be in error and mistakes may occur in this way and be perpetuated. It is interesting to receive feedback on this subject, from members who have grown spores which turn out to be incorrectly named.

Three further problems for the grower are whether he or she is actually receiving any

spores within the packets, contamination with other spores and whether the spores are viable. In an ideal world only packets which contained fresh pure spores would be sent out, but in practice it is often necessary to send out packets containing mostly dross in the hope that spores are present. Although this may be extremely frustrating for the grower, most people would probably prefer a small chance of success to none at all. Also, there is the excitement of exotic interlopers. Contamination is an ever-present hazard, which may occur when they are first collected, repackaged or, of course, most likely when finally sown. Viability is dependent on several factors, including storage and the natural life of the spores, and has already been mentioned. It should also, perhaps, be mentioned that, when raising fern cultivars from spores, only a proportion are likely to resemble the parent plant, and great care should be taken to select only the best forms. For instance, sporelings raised from *Polystichum setiferum* 'Plumosum Bevis' may yield only the straight species, but may also produce something exciting. In either case, they should not be called 'Bevis'.

I would like to thank all the members who have given me such tremendous help and encouragement over the past three years. I have found this very rewarding work, particularly as I have corresponded with many interesting overseas members for whom, often, the Spore Exchange is their main link with the Society.

Finally, WHERE NOW? I would like to know what members would like – greater variety, less variety but better quality, more new rarities, more good old cultivars, fresher spores, more information on synonyms, hardiness and cultivation requirements of the items on the list. I would like to develop the side of sending out very fresh spores, such as the osmundas, but would need definite sources of donors. I am also intending to build up a data bank of information about the spores, including synonyms, some indication of hardiness and country of origin. I am always very pleased to correspond with members about any aspect of running the Spore Exchange and, of course, welcome the receipt of correctly named spores at any time.

(This article is based on a paper read at the BPS autumn meeting, 1989).

SHORTER NOTE

The Past and the Future

In the *Weekend Telegraph* for Saturday 20 January 1990 the following paragraph appears in an article by Stephen Lacey –

“The polystichum called *P. aculeatum pulcherrimum* “Bevis” is apparently the absolute tops, and fern-lovers boast of it as if it were a Rolls-Royce. “The Jones’s have just bought a Bevis” they say. “How on earth are we going to keep up?” Its offspring cost £150 each.

Part of his information is very much past history – the fern is now known to be NOT *Polystichum aculeatum* but *P. setiferum* and the variety name is 'Plumosum Bevis'. Looking into the future, it is possible that one day a plant of 'Bevis progeny' may set you back £150, but, at present, the only ones likely to attract that price are two *exceedingly* – repeat *exceedingly* – rare variations which are possessed only by less than four or five dedicated fern growers. Completely barren and more than obstinate in the production of side crowns, it is most unlikely that they will ever become nurserymen's stock for sale.

I wish I could get £150 each for my many other 'Bevis progeny' plants! I could, indeed, be quite well off!

J W DYCE

FIDDLEHEAD FOOD?

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In case any ex-dinner guest of mine became alarmed at the news that "... "fiddleheads" contain high concentrations of carcinogenic agents", I felt I should write and clarify points raised in the last issue of the *Pteridologist*. In her article on bracken (*Pteridologist* 1, 6, 267), Stella Maris Turk made reference to people in Japan, America and Canada eating "this dangerous plant". While I would quite agree that bracken should be considered dangerous, and have heard of Americans and Canadians eating it, the "fiddleheads" (see photograph opposite) more commonly consumed, and indeed considered by some to be quite a delicacy, are the young fronds of *Matteuccia struthiopteris* (see photograph opposite). This plant is usually referred to as the "edible fiddlehead" (or "Ostrich fern") and its fronds have been tested and pronounced free from carcinogens. Indeed, a thriving industry is based on the harvesting, canning and freezing of *Matteuccia* fiddleheads (low in both calories and salt!) in Canada (see photographs opposite). The fern grows throughout much of the northern hemisphere, and can be cultivated in Britain. It is an attractive plant, with a strong "shuttlecock"-shaped growth habit impossible to confuse with the solitary fronds of bracken, and although I must admit to being rather unimpressed by its flavour, I would hate to deter future dinner guests from sampling this member of my collection.

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IN SEARCH OF THE ORIGINAL 'VICTORIAE'

NICK SCHRODER

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In his article in the 1980 *BPS Bulletin*, Jimmy Dyce pieces together some of the history behind what is perhaps the most remarkable variation ever encountered in our native species - *Athyrium filix femina* 'Victoriae', Queen of the Lady Ferns. The early part of the story, dating from its discovery near Loch Lomond in 1861, is now well-known. Equally well-known is the failure, in the progeny from this find, ever to achieve the stature, symmetry and degree of secondary crossing of the pinnules exhibited in offsets of the original plant. Having been frequently disappointed by the results of purchasing *A.f.f.* 'Victoriae' plants as "selected sporelings" or "from a good original" on offer from several sources I set out to fill some of the gaps in the more recent history of the original stock.

My search clearly had to start at Buchanan Castle itself (see photograph on p. 9), close to the site in Drymen of the original discovery, and where part of the plant is known to have remained for many years. Presumably Druery, who wrote of a visit to Loch Lomond shortly before the turn of the century, had been of the same mind. My first view of the Castle, which has fallen into ruin and is now almost as much a home to the local vegetation and wildlife as the woodland surrounding it, was a set-back. Worse still was the realisation that a small estate of modern bungalows built within the Castle grounds and bearing the street name "Castle Gardens" had recently been built upon the site of the old walled garden which housed the original 'Victoriae'.



An open packet of frozen fiddleheads
(*Matteucia struthiopteris*)



A tin of fiddleheads (*Matteucia struthiopteris*)



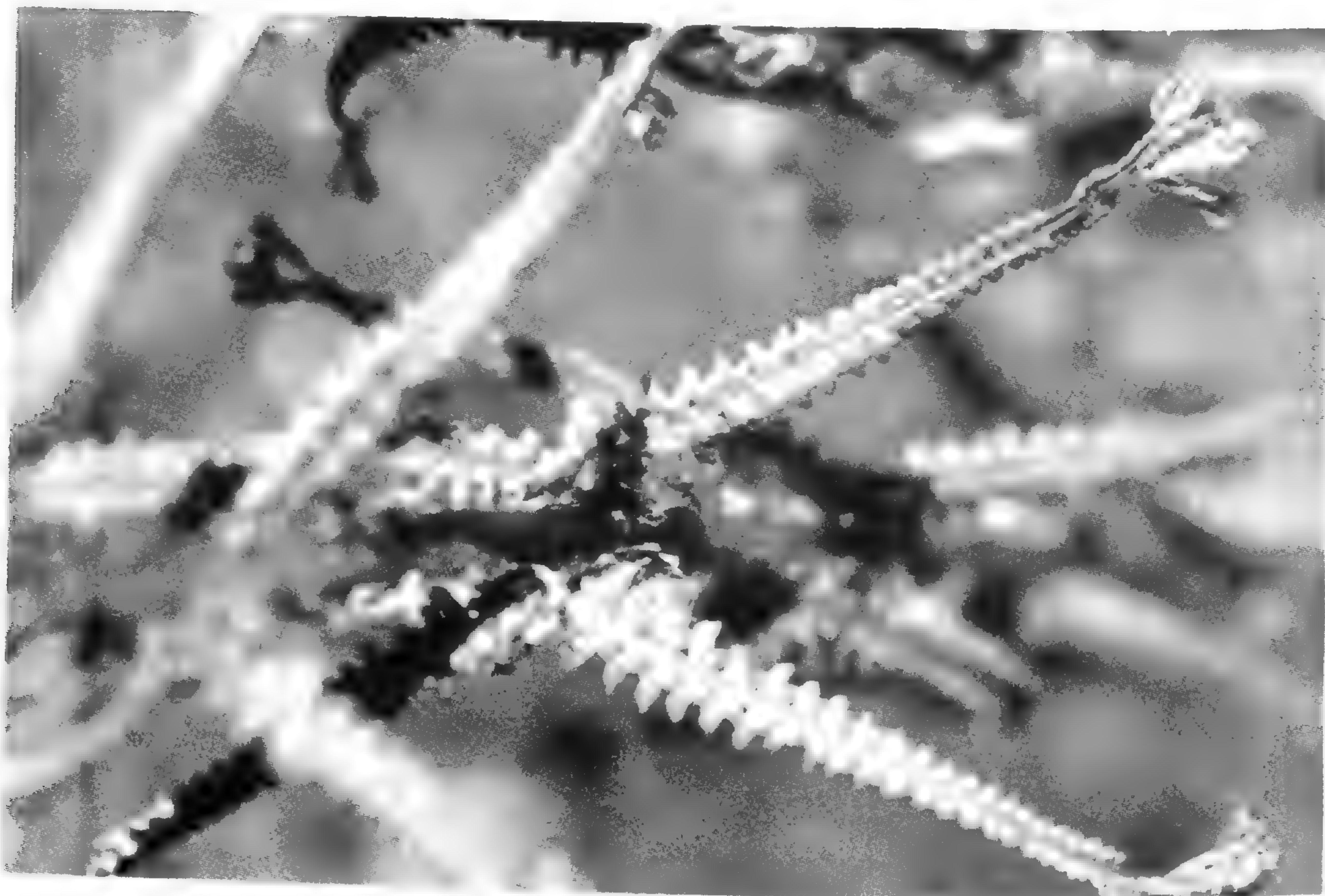
Fiddlehead fern (*Matteucia struthiopteris*)
in cultivation in Manchester



Fiddleheads of *Matteucia struthiopteris*



Athyrium filix-femina 'Victoriae', Loch Lomondside, September, 1989.



Athyrium filix-femina 'Victoriae'. Close up showing secondary crossing of pinnules.

However, I had the good fortune to meet the local officer of the Nature Conservancy Council who, having read the 1980 article, had himself taken up the search for what has locally become known as the Buchanan Fern. John Mitchell, whose assistance is gratefully acknowledged, related his success in locating three such plants in the Drymen area in one of the local Naturalist journals, although a fourth (subsequent) find in a nearby village cast doubt on the originality of the first three finds.

The subsequent find therefore appeared to be the most promising lead and my first opportunity to inspect this plant occurred in January 1989. Clearly this was not the best time of year to study a Lady Fern, especially when the plant had been "tidied up" for the winter. Yet this inspection did allow a close examination of the crown mass which was to prove impossible later in the year when the fronds were fully unfurled. All told, some sixteen large crowns were present in a mass the size of a dinner plate.



Buchanan Castle as it is today.

Furthermore, from the diameter of the remaining frond bases it was evident that each frond had been substantial.

A second visit in late summer removed all doubt - this was not merely a seedling from the original. The fronds reached 3ft 9ins from crown to tassel tip, and the three dimensional quality of each frond made for a superb display. The secondary crossing of the pinnules or "percruciate" character was also very evident. (See photographs opposite).

The proud owner of this magnificent specimen recounted the history of his plant, the scarcity of which he had been unaware of until now. In 1956 his father, having been widowed, moved from Drymen to live with his sister in nearby Killearn and the plant was transferred to the son's garden in a hamlet not far from Killearn where it stands today. For its earlier history there are two equally probable theories to explain how the family may have come to grow this plant.

The first goes back to John Mason, of Mason's Nursery at Drymen who, in the late 1920's had obtained a piece of the original find and had grown this in order to raise sporelings for sale. Several seedlings found in the Drymen area undoubtedly are from this source. The present owner's father, however, was a keen plantsman and was a

good friend of Mason through the local volunteer fire service – such local brigades were common at the time, and both men served in Drymen. Through this friendship a piece of the original was possibly passed on in the mid '30s.

The second, and more simple, theory stems from the fact that the present owner's father was a professional waller and worked on the Buchanan Estate. The work would necessarily have brought him into regular contact with the walled garden and stone built fernery. As a fellow member of staff, contact with the Head Gardener would also have been on a regular basis.

Whichever theory is correct must remain a mystery, although one thing is certain – we are indebted to the present owner's family for the part they have played in preserving this living piece of pteridological history, which must count as the most substantial clump of the original 'Victoriae' known to exist, although it is possible that similar discoveries have still to be made. Through the generosity of its owner, and on the understanding that every effort will be made to distribute the plant and thus to ensure its preservation, pieces of the plant have been obtained and distributed to members of the Society covering a range of locations so as to ensure a wide geographic spread, and to encourage further distribution as vegetative propagation becomes possible. Moreover, it is anticipated that spores from these offsets will be freely available via the spore exchange scheme and will hopefully be used by our would-be hybridisers in their quest for new departures in fern variation.

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BOOK REVIEW

SOMERSET FERNS: A FIELD GUIDE by Pat Hill-Cottingham. *Aspects of Somerset, Natural History Series No. 1. 84 pp. 1989. Somerset Archaeological & Natural History Society, Taunton Castle, Taunton, Somerset TA1 4AD. Price £2.50 (£3.00 incl. p.p.)*

This attractive little book attempts to give you all you want to know on ferns (no clubmosses or horsetails) growing in Somerset. Details of the species include descriptions with silhouette illustrations, habitat notes and a brief comment on their distribution in Somerset. There is the usual introduction to ferns and how to recognise them, one dichotomous (often trichotomous) key, one multi-access key, and a glossary.

The book should enthuse local amateur natural historians to take more of an interest in ferns and, armed with nothing more, a person could become acquainted with most of the common species of ferns in the area. However, even though I recommend its purchase, there are a number of improvements that could have been made. It is reasonably easy to distinguish the sub-species of *Dryopteris affinis*, so I would not have left such details to an appendix. Similarly, I would have liked to see mention of hybrids, such as *Polystichum x bicknellii*, which are either known from the area or yet might be found there. The silhouettes are sometimes of fronds which have lost the basal part of the rachis and there are also a few inaccuracies of terminology that might mislead beginners later on. Nevertheless the book is effective as a beginner's guide and I suspect that the low price will quite rightly attract a large number of buyers.

BARRY A. THOMAS

THE MAN WHO DIED COLLECTING WOODSIA - A brief account of the life of William Williams the 'Botanical Guide' (1805-1861)

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As mountaineering gained popularity during the first half of the 19th century the saga which has evolved from that 'golden age' appear in such books as Edward Whymper's 'Scrambles Among the Alps' and John Tyndall's 'Hours of Exercise in the Alps'. From literature such as this we learn of the vital role that local guides played in early mountaineering and botanical expeditions. Not only did the visiting climbers and botanists benefit from the locals' intimate knowledge of their native mountains and valleys, but it was fashionable in those days to hire a guide.

There were many guides operating in Snowdonia during this period, and although they never attained the same level of publicity as that of the romanticized Alpinists, they form an important chapter in the history of the mountainous region known as Eryri.

One of the busiest guides of this period was William Williams of the Royal Victoria Hotel, Llanberis, a man who was known locally as 'Will Boots'. In addition to the normal services provided by guides in conducting visitors to the summit of Snowdon, Williams was also a specialist. He was familiar with the localities of the rare plants of the district, with a particular interest in the rarer ferns, and occasionally ascended Snowdon three times in one day; his clients mounted on sturdy ponies while he walked.

William Williams was born in the parish of Llanfwrog, Denbighshire, in 1805 and entered service as a groom when 13 years old. He worked for M. Turner, Abbots Bromley, Staffordshire for 4 years, and then in the White Lion, Rhuthun, and also the Black Lion, Mold as a driver. He later moved to Bangor, working in the Liverpool Arms and the Penrhyn Arms. During his stay in Bangor he attended school for 6 months, the fees being paid by himself. This was the only course of formal education he ever received. He came to live in Llanberis in 1832 and worked at the Dolbadarn Hotel before moving to the Royal Victoria where he gained reputation as the 'Botanical Guide'.

There is no evidence to show how or when he first became interested in botany, and according to one source, another local guide, his first interests were crystals and insects. It is almost certain that Williams' knowledge of plants was restricted to the rarities, and that he profited from this knowledge during the fern collecting era.

He was known to many of the leading botanists of the day, and it is certain that he benefited from his acquaintance with Charles Cardale Babington (1808-1895) who later became Professor of Botany at Cambridge. Babington was a regular visitor to Snowdonia, missing no opportunity to see in their natural habitats the plants about which he taught.

When Edward Newman (1801-1876) published his classic book 'A History of British Ferns' we see from a passage on page 77 in the 1854 edition that he also was acquainted with Williams. "William Williams, an active and intelligent Snowdon Guide is but too well acquainted with the Snowdonian station of both the Woodsias: I don't think he would willingly exterminate them, but he is subject to such constant solicitations from botanical tourists to be conducted to the localities..." - further proof of the demand on Williams' services during the Victorian fern craze. William Pamplin (1806-1899) was another friend of Williams; born in Chelsea, he came to live in Llandderfel, Merionethshire, where he tried to establish the North Wales Central Botanic Gardens. Pamplin spoke of Williams with respect and praise, but this is not the case with all the botanists who came in contact with him. In an article on the plants of Snowdon by John Barton of Cambridge which was written in April 1857, the author accuses Williams of deliberately

misleading him. Barton and a friend had ascended Snowdon from Beddgelert and saw Williams in one of the summit huts. The guide had come up the pony track from Llanberis with a gentleman to see the sunrise. Later, while Barton and his friend were coming down the 'zig-zags' from Bwlch Glas they saw Williams climbing up one of the cliffs of Clogwyn y Garnedd. "We had little doubt", says Barton, "that he was engaged in a search after some rare plants, as he had the reputation of being well acquainted with almost every inch of the whole Snowdon district." Barton's curiosity got the better of him and he went across to meet Williams at the foot of the cliff. "He came down to us with a magnificent specimen of *Aspidium lonchitis* which he had just obtained from the heights above." During the conversation which followed Williams agreed to accompany them to where the *Woodsia* was to be found, but Barton was still not satisfied. "He showed us a very small plant of what he declared to be *Woodsia hyperborea*, but for the genuineness of which I could not venture to vouch, as all the mature fronds had been stripped off for the gratification of some greedy fern-hunters. The plant itself was completely hidden under a piece of rock, so that we had before walked almost over it; and Williams informed us, with a grin, that it was his usual practice either thus to hide up all the plants of *Woodsia* he could find, or to transplant them when growing in too exposed a situation, so as to prevent all possibility of their being detected. Another piece of information which he volunteered with equal satisfaction to himself was, that he was accustomed to give wrong habitats when applied to by Newman and other writers on ferns for the localities of rare species." Williams then led the party to the summit of Crib y Ddisgl, along the ridge to Bwlch Coch, and down through Cwmglas Mawr to the Llanberis Pass, seeing such plants as *Saussurea alpina*, *Polystichum lonchitis*, *Lloydia serotina*, *Asplenium viride* and *Cystopteris fragilis* on the way, but not more *Woodsias*. "Williams' intention evidently was to lure us from the spot," moans Barton, and he concludes his article by stating "I would give my humble advice to all future explorers in those regions to trust to nothing but their own eyes and accurate observation of the various geological strata while searching for plants."

Pamplin, on the other hand, speaks highly of him in a letter written in Llandderfel in January 1858, in which we get an account of Williams leading a botanical ramble into the mountains. The party left the Rectory at Llanberis at 9 in the morning and walked up the Llanberis Pass as far as Pont y Gromlech. Williams then led them up the steep heather and scree slope to the summit of Glyder Fawr. From here they took a north-easterly course following the ridge of Braich y Gribin down towards Cwm Idwal. Here follows an interesting list of the plants that Williams showed the party, among them *Lloydia serotina*, *Antennaria dioica* and *Dryas octopetala*. It was interesting to learn how Williams gathered specimens of *Polystichum lonchitis* and *Woodsia ilvensis* to give to Pamplin. I have never seen a single frond of *P. lonchitis* in Cwm Idwal itself and *Woodsia ilvensis* is quite scarce in the area. Pamplin concludes by praising Williams' efforts in assuring that as wide a variety of plants as possible was seen during the course of the day's walk. A list of rare plants appeared in a small guide book to Snowdon published by Humphreys of Caernarfon during the 1850s followed by a footnote which reads: "We are favoured with the above List from the Visitors Book of Mr William Williams, Guide to Snowdon from Llanberis."

In *The Gardener's Chronicle* of July 11th 1863, Mr John Field mentions a rumour that Williams had planted Irish specimens of the rare *Trichomanes speciosum* in the Snowdon district. Most probably we will never know if this is true, or if any of the introduced plants ever survived. It will forever remain a tantalising thought in the minds of fern enthusiasts during visits to Snowdonia. (At a later date Herbert Stansfield also reputedly introduced *T. speciosum* into wild localities in North Wales (Hawkins, 1928)).

There is no question as to the extent of Williams' knowledge of the native plants of Snowdonia, and he regarded the rarer ferns with a distinct possessiveness, and would

only show the localities to those whom he trusted. He was quite an original character with a flair for gaining publicity and wore a fur cap bearing the words "Botanist Guide" in bold letters. The following lines which were sent for publication to the North Wales Chronicle a short time after his death, is said to be the guide's own work.

William Williams, guide to Snowdon,
 Anxious that all those who 'bode in
 England, Scotland, or old Ireland,
 Should place their feet upon much higher land
 Than ever was in those parts seen
 By young or old that e'er have been,
 Gives notice, that if here they'll ride,
 He, with much pleasure as their guide,
 Will show them quarries, lakes, and mines,
 Snowdon, and the place he finds,
 Plants that nowhere else abound,
 And which by him alone are found:
 Waterfalls with various actions,
 Minerals, ores, and pertifactions;
 The house where Margaret Evan died,
 St. Perry's well and all beside:
 Anglers too, who with a boat
 Can be supplied and when afloat,
 Will find at once by asking him,
 The places where the best trout swim;
 In fact to him, no place is new,
 Within the range of Snowdon view
 Excepting one, which he declares
 To bring folks to he never dares,
 Not being on the best of terms
 With him who owns these hot concerns, -
 "The Devil's Kitchen", it is named,
 And by some tourists is much famed;
 'Tis here, we're told, the king satanic
 Allures his own by means botanic,
 But there are guides who know it true,
 Its inmost parts and master too,
 And folks who wish to go with these,
 Can walk the road with greatest ease;
 To guide elsewhere, 'midst many millions,
 There's none so good as William Williams.

At 10 a.m. on the morning of June 13th, 1861, Williams set out from the village of Llanberis to conduct a lady and gentlemen to the summit of Snowdon, and then down to Beddgelert. During the course of the ascent Williams left the couple to go and collect plants and rejoined them later on. After reaching the summit he left them again, this time to collect specimens of *Woodsia alpina* for his clients. On this occasion he failed to return. Meanwhile his clients, who were waiting for him in one of the summit huts, decided to continue their journey guideless down to Beddgelert. Word soon got around about Williams' disappearance and subsequently a search party was organized. His body was later found at the foot of a precipice on Clogwyn y Garnedd and, according to a report in one of the local newspapers, the accident occurred as a result of a broken rope.

He was buried at Nant Peris on the 16th of June 1861, and his tombstone is marked with the following inscription.

**UNDERNEATH
LIE THE REMAINS OF
WILLIAM WILLIAMS
UPWARD OF TWENTY FIVE
YEARS BOTANICAL GUIDE AT
THE ROYAL VICTORIA HOTEL
WHO WAS KILLED BY A FALL
FROM CLOGWYN Y GARNEDD
JUNE 13 1861, WHILST PURSUING
HIS FAVOURITE VOCATION
This Tombstone was erected to
his memory by a few friends**

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BOOK REVIEW

HENRY POTTER'S FIELD GUIDE TO THE HYBRID FERNS OF THE NORTH EAST
 by Frank and Libby Thorne. Vermont Institute of Natural Science, Vermont 05091,
 USA. \$14.95 (p & p \$2.50).

This book, more than any other I have read for a long time, illustrates how an enthusiastic amateur can do so much by discovering and describing fern hybrids. Written as a tribute to Henry Potter by two friends and fellow amateur pteridologists, the book gives descriptions, key factors in hybrid identification and photographs of the 21 hybrids in northern New England and eastern New York. Henry Potter (1891-1986) was a Vermont farmer who studied his local natural history for most of his life and spent many years later studying fern hybrids, especially of *Dryopteris*. The book is said to have been written to complete his work and his wish to publish a field guide. The way it is written will ensure its usefulness in field identification and in the herbarium. The book is clearly of value to anyone interested in the American ferns but it should also, hopefully, stimulate others to search for hybrids as thoroughly as Henry Potter did.

B.A. THOMAS

POLYSTICHUM SETIFERUM 'DIVISILOBUM BLAND'

J W DYCE

46 Sedley Rise, Loughton, Essex IG10 1LT

Although this fern is named 'Divisilobum Bland' it is, in fact, a true *plumoso-divisilobum*. It was a wild find, made about 1910 by J H Bland of Tobarcooran, Carmoney, Co Antrim, on Carmoney Hill a few miles from Belfast. About 1914 the finder sent the fern to a Mr Bensted of Detling, near Maidstone in Kent. Mr J E Austin of West Court, Detling acquired it from Mr Bensted and in 1920 a plant was sent by Mr Austin to Dr F W Stansfield who named it *Polystichum angulare* (now *setiferum*) 'Divisilobum Bland'.

It is not only the best *divisilobum* ever found wild but is, undoubtedly, the finest pure *divisilobe* in cultivation, notwithstanding the number of other beautiful forms found wild, and the still greater number raised from the spores of the Jones-Fox and other strains. It is in every way superior to 'Divisilobum proliferum Bagg' (Henleyae) which Col Jones (of *Jones' Nature Prints* fame, - see *Pteridologist*, Vol 1 part 6, pp. 262-264) thought could hardly be surpassed.

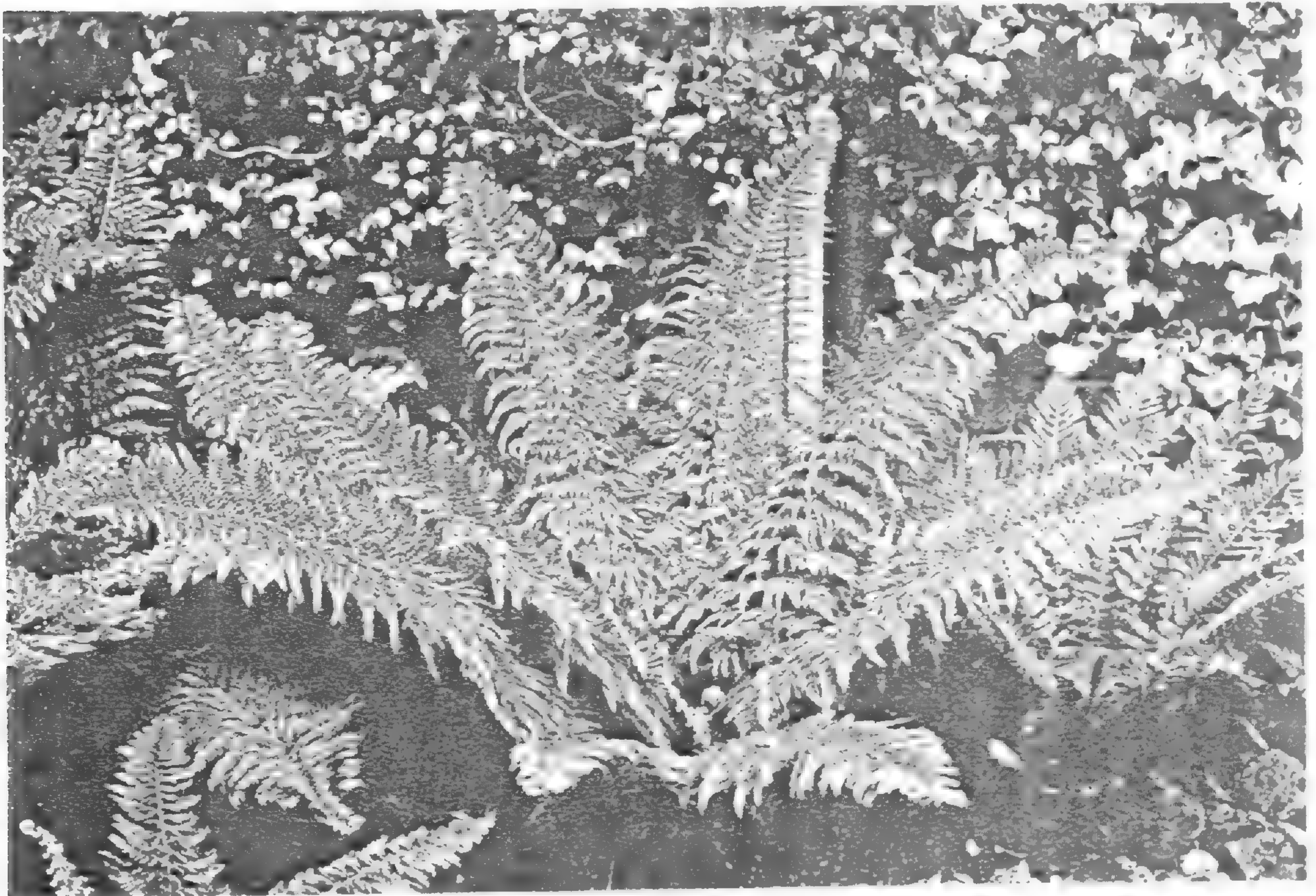


Fig. 1. *Polystichum setiferum* 'Divisilobum Bland'
(Reproduced from the *British Fern Gazette* Vol. VI, 1930).

In the lower half of the frond the lower pinnules are very long, overlapping and finely dissected. They are quadripinnate even in the half-mature stage and can even be quinquepinnate when well-developed. The ultimate segments are spiny and very slender, giving the fronds and the plant a very open and airy appearance. The pinnules in the upper half of the frond are tripinnate only and much shorter. The variety is a good grower, is fertile and produces spores freely, as well as bulbils. Right from its early days in cultivation the bulbils have been found to be not very easy to grow on into plants and this has been proved so by me, except on a very few occasions when we have had very wet summers. In addition, my plant has been very loathe to develop side crowns.

My plant of 'Divisilobum Bland' was received in 1950 from P Greenfield who wrote me as follows - "My few *Blands* were raised from bulbils the first year after the Doctor (Dr F W Stansfield, his father-in-law) gave me the plant - wherein I was lucky, but I have never had an offset from a crown". I was lucky in that the plant I received from



Fig. 2. Sample pinnae from twelve different plants.
All first generation progeny of *P. setiferum* 'Divisilobum Bland'.

Greenfield in 1950 showed a small offset the same year and I was able to detach it from the parent two years later and grow it on successfully. In due course it was presented to another fern grower. I have never had another offset since.

In most years my *Bland* produces a large crop of bulbils and in wet summers these develop into tiny plantlets. When this happens, hopefully I peg down some of the fronds on to fine compost and, for a time, they seem to do well, but eventually the young plants die off, confirming the experience of the early growers. Very rarely, a few reach the stage when I can plant them out separately but they have only survived successfully when grown on to a good size in a wardian case.

I have never seriously attempted to grow this fern from spores. Looking back through my old records I note that I made a sowing in 1952 which successfully produced a host of tiny plants. These were planted on but following records do not mention them and I presume they were given away – or, more likely, died! I still have only the one plant, growing as strongly as ever, a fern to be greatly admired. In addition, I am lavishing much attention on a 1988 bulbil which has lived through the 1989 drought and, with luck, may become my number two plant.

When I submitted this article to our Editor for his approval he promptly wrote back, telling me that he had made a successful sowing some years ago from *Bland* spores which he had received from me. He sent me twelve fronds from the plants he raised, ranging from exceedingly plumose varieties to some with very simple development in the pinnules. I was most interested in them and depict some of them here. They are the first progeny of *Bland* I have seen or known about (see Fig. 2). Compared with the parent (see Fig. 1), the progeny demonstrate excellently the wide range of form, including some plants with their division much more elaborated. This can be expected when sowing spores from a good variety which has already diverged greatly from the species form.

At present, all my ferns, including my plant of *Bland*, are being moved to our Editor's garden – sadly, I am getting too old to look after them properly. Any members, interested in *P. setiferum* 'Divisilobum Bland' and wishing to "try their hand" with its spores, can probably obtain some from Martin Rickard this summer and, with some luck and proper attention, achieve results similar to his.

EQUISETUM X FONT-QUERI IN ANGLESEY

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Equisetum x font-queri Rothm., the hybrid between *E. palustre* L. and *E. telmateia* Ehrh., was first noticed in July 1989, during a visit to the small area of dunes at Traeth Lligwy on the east coast of Anglesey, v.-c. 52. This was formerly an attractive place with plants such as *Sanguisorba minor*, *Galium verum*, *Anacamptis pyramidalis*, an abundance of *Rosa pimpinellifolia* and much *Equisetum*. However, increasing public pressure over the past thirty years and especially the construction of two large car-parks, one at each end of the bay, has resulted in the destruction of a large part of the dunes.

The hybrid was found on the stable dunes furthest from the shore, where it forms a dense and continuous stand for over 65 metres along the dunes and extends for 25 metres inland under the fringe of Grey Sallows which border the dunes at this spot. The plant was conspicuous by the large size of its shoots, many of them over 90 cm tall, and their pencil-thick stems (cf. Page, 1982) with very pale, succulent-looking internodes. These features, as well as the presence of cones on some of the shoots, indicated that it might be the hybrid between *E. palustre* and *E. telmateia*. Material sent to Edinburgh was confirmed as this hybrid by Dr. C.N. Page, who commented that

it had all the features of the previous finds except for the somewhat longer branches (frequently more than 20 cm long) giving the shoots a bushier appearance and often an overall outline closer to that of *E. telmateia*.

In addition to the conspicuously pale internodes of the main shoots, other characters which show the influence of *E. telmateia* are the long teeth on the main-stem sheaths and the shallowly biangulate branch ridges. The similarity to *E. palustre* can be seen in the extended branchless tips of the main shoots (often 10 cm or more), the more robust branches, the broader white margins to the teeth of the branch sheaths, as well as to those of the sheaths of the main shoots, and in the monomorphic habit of the shoots themselves.

When the colony was first found, many of the cones had already been lost, but examination of those still intact showed that most of the spores are abortive, being small, deformed and colourless, the few larger ones having "rudimentary though inoperative elators" as Dr. Page remarked.

Unlike the Worcestershire colony (Roberts & Page, 1979) which has neither parent in the immediate vicinity, the Traeth Lligwy hybrid has *E. palustre* growing within a few metres of it on the lower-lying, wetter sandy soil close to the stream, Afon Lligwy, which here enters the sea, while *E. telmateia* occurs in abundance about 250 metres away at the northern end of the dunes, growing on a heavy, poorly-drained loam with a subsoil of reddish-brown clay derived from Triassic till (Roberts, 1958). The presence of both parents suggests that, as in the case of the Shropshire colony (Page & Busby, 1985), *E. x font-queri* has arisen locally at this site by hybridisation between the parent species. Moreover, the size of the colony indicates that it has been established here for a considerable time.

The ability of *E. x font-queri* to occupy a wide range of habitats from roadside banks and ditches to all gradations of adjacent moorland on the Isle of Skye has already been described (Page 1973, 1988). The Worcestershire colony grows among coarse limestone chippings capping a disused railway embankment (Roberts & Page, 1979), while the Shropshire colony occupies base-rich soil alongside a canal towpath and at the bottom of an adjacent hedge (Page & Busby, 1985). The Anglesey colony differs from all of them in being found on stabilised calcareous dune sand overlying a layer of boulder clay, with the water table not far below the surface. But here, too, its vigorous spread and the manner in which it appears to have displaced the other horsetails, *E. arvense* and *E. palustre*, upholds the claim by Page (1988) that this is "probably the most vigorous of all our horsetail hybrids."

I am grateful to Dr. C.N. Page for reading the note in manuscript and making some helpful comments. Also to Mrs. M.R. Davies for her help in the field.

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BULBILS ON POLPODIUM

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At one of Fibrex Nursery's shows in London during 1989 our member, Stuart Williams, noticed bulbils on *Polypodium vulgare* agg. 'Elegantissimum'. Knowing my interest in polypodiums Hazel Key of Fibrex Nurseries drew my attention to this and showed me some plants covered with bulbils.

The bulbils are produced direct from the sorus and take the place of the sporangia - a phenomenon known as apospory. Each sorus produces a tuft of several young fronds, all simple, exactly like the first leaf of a polypod sporophyte when produced via the normal sexual process. Virtually every sorus is given over, at least in part, to these aposporous growths with primary leaves at all stages of development.

I had never heard of bulbiferous polypods and therefore excitedly made inquiries to some of our more knowledgeable members, but they too had never heard of anything like it in polypodium.

I was left to wonder why plants at Fibrex should have behaved so unusually; surely, if it happened in 1989 it must have happened before? Sure enough, a search of that unsurpassed mine of all information pteridological, *The British Fern Gazette* revealed several references to bulbils on *P. vulgare* agg. 'Elegantissimum'.

In 1915 no less an authority than C T Druery commented:

'...the fern (Elegantissimum') is additionally interesting as a producer of dorsal bulbils on the more dissected fronds under favourable cultural conditions, but our own attempts to raise from them have so far failed. These bulbils appear in conjunction with the spore heaps, a rare but not unique phenomenon' (*The British Fern Gazette*, Vol.3, p9, 1915).

Later, in 1971, Druery again wrote on this subject:

'...soral bulbils have been recorded as occurring on *Adiantum capillus-veneris* 'Daphnites' and 'Imbricatum' and on *Polypodium vulgare* 'Elegantissimum', while most of the superbum section of plumrose Athyria have inherited the capacity from the original wild Axminster find. In all these cases the bulbils are seated on the soral sites, and are usually accompanied by sporangia grading from imperfect and aborted ones to perfect ones with a full complement of perfect spores which germinate freely and yield fairly typical plants (see Sykes, *Pteridologist*, 1988). In the case of the polypodium, such bulbils occur only on the most highly developed fronds, and on pinnules of extremely fine cutting, the terminals of which run out into nearly inch long lingual extensions, pointing, I think, to aposporal tendencies. The sori are massive and consist of filamentous processes, some of which lengthen out into fronds, while others form perfect sporangia of normal golden yellow colour. Here, then, do not appear those massive cellular growths which are found on the Athyria, but in time one bulbil gets the predominance and a little plant of several small fronds is developed. Unfortunately, neither my leisure nor my training permit me to investigate properly transitional stages which must exist in cases like these,....' (*The British Fern Gazette*, Vol. 3, p196-197, 1917).

This quote suggests that Druery *might* have raised plants from his bulbils. More recently, in 1934, Paul Kestner, a Swiss member added:

'...viz. *P. vulgare* 'Trichomanoides' which produces bulbils in the sori instead of sporangia (so does 'Cornubiense' but to a lesser extent). I try every year to grow ferns from these bulbils, but, so far, without success.... I shall be glad to know if anyone has had success in this direction'. (*The British Fern Gazette*, Vol. 6 p299, 1934).

It is interesting here that Herr Kestner found bulbils on 'Trichomanoides' and 'Cornubiense'. Unfortunately, due to confusion in nomenclature within this group it is difficult to know which varieties he meant but it is possible that either of these two varieties, common law 'Cornubiense', and what we today call 'Trichomanoides' could produce bulbils as well as 'Elegantissimum'.

I believe that bulbils on 'Elegantissimum' have been seen only rarely because the plant needs to be grown in optimum conditions under glass - rarely available to growers these days. In future, however, it might be worth growing some of these plants under protected conditions in the hope that bulbils will be produced in sufficient quantity to allow some success in their propagation.

To date Fibrex Nursery have pegged out several fronds on a heated mist bench and I await with great interest the outcome of their experiment.

SHORTER NOTE

An idea for growing Polypodiums

Polypodium australe, the Southern Polypody, is scarce in the British Isles. It is largely confined to limestone rocks and walls in the south and west. In Europe it is much more common, particularly in the Mediterranean region and on the Iberian peninsula where the summers are hot and dry and limestone is common. *P. australe* obviously thrives in such situations, enduring the hottest months in a dormant state, not flushing its new fronds until August or September.

Transferred to the garden this character of summer dormancy is a nuisance. At a time when most garden plants are at their peak *P. australe* and its cultivars can look a mess, with only old dying fronds or, at best, a bare patch of soil.

In my garden where I grow quite a lot of polypodiums, this phenomenon is a big problem. Entire beds are non-events for the three best summer months. One way of counteracting the problem on a small scale is to plant clumps of polypods as isolated patches. This I have done with some success but recently in the garden of Robert Bolton of Birdbrook, Essex, I came across a more novel way of growing these fascinating plants.

Here polypods have been planted as a strip around the edge of an island bed. This strip is only about 1 foot (30 cm) wide. The centre of the bed has been filled with other plants of choice. The beauty of this design is that in summer the bare edges of the bed containing the polypods is inconspicuous, while at other times there is a handsome fringe of beautiful green fronds - right through the middle of winter, of course.

Another advantage of this scheme is that polypods are well able to withstand the exposure inevitable at the edge of the bed.

Having seen Robert Bolton's garden I have tried out the same idea. So far I am encouraged that it will be a success. Time will tell!

Footnote: If any member would like to see Robert Bolton's border for themselves please contact Robert Bolton at any reasonable time (Daytime: Ridgewell 246, evenings or weekends: Ridgewell 258).

MARTIN H RICKARD

GROPING AFTER FERNS IN THE FIFTEENTH CENTURY

E. CHARLES NELSON

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Ferns do not have an especially prominent place in early manuscript herbals which were essentially encyclopaedias of medicinal plants rather than regional floras or field guides. Those ferns believed to be efficacious were figured and noted among the flowering plants, mosses, fungi and other simples, but very few of the surviving hand-painted mediaeval herbals contain pteridophyte illustrations of the quality displayed by Ms. Egerton 2020, now in the British Library, London - Blunt & Raphael (1979) reproduced the wonderful *Viola odorata* (violet) and *Vitis vinifera* (vine) by the anonymous artist who worked in Padua about 1400. The meticulous portrayal of violet and vine by the master of Egerton 2020 contrasts starkly with the work, one century later about 1500, of another anonymous Italian who illustrated a herbal now in the University of Vermont (580.9 M31-45.716) - in Blunt & Raphael (1979) some folios are reproduced including that which shows 'polipodio'. At least it is possible to agree that the object is a fern, of the genus *Polypodium*, but this particular portrait has none of the lucidity of the earlier artist's work. I contrast these two merely as exemplars of the chaotic state of European botanical art during the mediaeval period: just as today there were highlights and nadirs; plants were not usually depicted accurately, and a substantial proportion of the portraits were entirely fictitious.

There is, however, one illustrated mediaeval herbal which seems to contradict those general remarks. It is a fifteenth century botanico-medicinal manuscript preserved today in the Royal Library, Albert I, Brussels, and coldly labelled Codex Bruxellensis IV. 1024 (Opsomer 1980, 1984).

The text of Codex Bruxellensis IV. 1024 is a compilation mainly derived from Matthaeus Platerius's *De simplicibus medicina* (otherwise known as *Circa instans*); for convenience the manuscript can be called *Livre des simples medecines*. It is brilliantly illuminated; whereas the text is the work of a single scribe, the 457 miniatures (almost every page is embellished) clearly were added by more than one artist. The illuminations are of three general kinds, perhaps by three artists. Thirty-four of the miniatures portray contemporary scenes, each one more or less relevant to the paragraphs that it illustrates: there is a townscape with two chimney-sweeps, one wearing a straw boater, his green tunic covering an ample stomach (f.90r); a glass-maker with a shield over his eyes (f.205r) blows a globe; a man smelting copper in a furnace (f.116r) is assisted by two others working bellows; a housewife with a broom swats huge spiders (f.200r) as her daughter and the cat play around her feet. There are groups of animals in some of the miniatures: the elephant (f.184r) is amazing; on its back is a castle, secured by two buckled leather straps, in which stand two knights in full armour holding scarlet lances. Elsewhere there are lions: one (f.147v) emerging from a dark forest frightens a man; another wonderful lion (f.123r) firmly restrains a most efficacious 'Leontopodium' (*Alchemilla* sp.) with his paws, as the text declaims:

Leontopodium is a herb called pié de lion (lion's foot)... It grows in open fields and near ditches..., a married man who is unable to have intercourse with his wife should gather this plant which has 7 branches when the moon is waning, he should cook it in water and wash the whole of his body in it. On the first night he should make a fumigation of aristolochia in front of his bedroom, then go in to his wife, and he will do his duty.

Three hundred and ninety-four botanical miniatures add to the glory of Codex Bruxellensis IV. 1024 which has been published in facsimile (Opsomer 1980) with an accompanying volume of essays that explain the herbal's origins, and a complete English translation of the quaint text (Opsomer 1984). William Stearn has contributed an essay on mediaeval

plant names and illustrations, in which he accepts that the mixture of vignettes, and fictitious and real plant portraits indicates the work of several artists. Some of the plants are indeed superbly portrayed - *Hyoscyamus niger* (henbane, f.105r), *Geum urbanum* (wood avens, f.96v), *Anthemis cotula* (stinking chamomile, f.62v), *Cichorium intybus* (cichory, f.183v), *Agrostemma githago* (corncockle, f.96r), and *Euphrasia* sp. (eyebright, f.82v) are a few of the best. The fictitious portraits are crudely imaginative.

One of the company of artists who painted the miniatures evidently lived in a city with crumbling walls. He was a most observant person, noticing and painting the gaping cracks between the bricks and stones - the chimney-sweeps (f.90r) are seen against a background of well maintained houses, whereas the furnace for one coppersmith is in a very rickety building (f.78r). What is most obvious in this particular artist's work is his portrayal of the plants of the decadent city. He saw that there were ferns rooted in the crumbling mortar, and faithfully portrayed them in these habitats - *Adiantum ruta.muraria* (f.44r - the editors of the facsimile dubbed this portrait 'fictitious' because it accompanies the text about 'Capellis veneris' but it is surely an accurate representation of wall rue), *Asplenium adiantum-nigrum* (f.65v - a trifle crude and supposed to be *Ceterach officinarum*), *Asplenium trichomanes* (f.169r) and a thoroughly accurate *Phyllitis scolopendrium* (f.192v). Are these, perhaps, the earliest portraits of ferns in their natural habitats? He also depicted ivy tumbling over a doorway, with its stems creeping through the gaping cracks in the city walls (f.82r), and *Sedum acre* (f.208v) and *Sempervivum tectorum* (f.180r) growing on walls. Alongside the paragraph on 'polipode' in *Livre des simples medecines* is another lovely fern portrait but the plant is not shown growing in a wall - the subject (most probably *Oreopteris limbosperma*) does not occur in such rocky habitats, anyway. This particular picture was perhaps not painted by the artist who loved walls but by another who was meticulous in his use of living plants as templates and who, to illustrate 'polipode', gathered not a species of *Polypodium* but a fine specimen of the lemon-scented fern.

The original text accompanying the miniatures is in Latin, and the archaic script is not easy to decipher, but the helpful translation (Opsomer 1984) allows us to savour the mediaeval herbalists' lore. Thus of 'polipode', we may learn that it cures 'gripes'.

... crush it and cook it, or cook its powder with scented spices and use it... (to) make polypody pancakes with flour and eggs and eat them. They loosen the belly sufficiently, sometimes too much.

'Scolopende' (hart's tongue fern) was also cooked, this time in water and wine, and given in a drink to relieve pain in the spleen and 'to clear the liver passage'.

If you can find some in a sunny place, make pancakes of it with flour and give it for nine days at the most. It is very good because this plant makes one urinate very well.

'Pollitric', the herbalist wrote, grows 'against walls, in wells and damp places', and the illustration is startling - a maidenhair spleenwort with crowded pinnae distinctly 'attached to the midrib by the centre' (cf. Rickard (1989) on *Asplenium trichomanes* subsp. *pachyrachis!*). Moreover this fern (perhaps indeed this subspecies) is recommended as an antidote for a 'pain in the neck'! For this complaint we are advised to

... crush the entire plant with leek leaves, 8 grains of pepper and 8 of coriander with some good wine, and give to drink. First of all, the patient must take a bath.

Some advice to get rid of almost any manifestation of pains in the neck, methinks, but I have not tried it even on a pteridomaniac.

Meantime, fern-fanciers impaled on barbed wire fences or hawthorn bushes should commit to memory the invaluable receipt inscribed under 'Filex' (not illustrated, but

identified by the editors as *Polypodium vulgare*).

Here is a wonderful means of extracting arrows, thorns and other things embedded in the flesh or in the body. Mix together fennel and fern root, add a sufficient quantity of honey, boil all these together in an iron saucepan until the mixture takes on the consistency of a plaster, and apply this, it is wonderfully effective.

No advice is given on what to do while you wait for the miraculous plaster to cook, but remember to pack an iron saucepan, fennel and honey in your vasculum when next out fern-hunting.

As an example of fifteenth century European botanical illustration and of mediaeval medico-botanical treatises, Codex Bruxellensis IV. 1024 is of outstanding importance. The quaint cures regaled in it are entrancing, but the work of the artist who drew ferns growing on walls is probably the most fascinating aspect of this masterpiece. He - and I use that pronoun deliberately - was no unworldly recluse, and his impish sense of humour is very evident. To illustrate *grain froissie* (f.100r) he created a vignette in which a man is using a pestle and mortar; behind him stands a naked woman who has covered his eyes with her hands; the modern editor suggests that the lady has just surprised the miller, playfully quipping "Guess who?" Even more illuminating is the scene in a dairy (f.30v): a rotund milk-maid churns as a cat steals the cream: there is a man, his face mostly hidden, outside the dairy but so determined to play that he has stretched both arms through the window and is groping the maiden - there can be no other interpretation!

And thereby, dear readers, my title. What modern flora gives us such a wondrous insight into pteridophyte ecology and the lust for life?

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BOOK NOTES

For the attention of holders of Volume 5 of Ferns: British and Exotic by E J Lowe purchased from BPS Booksales.

I have found among my books in *BPS Booksales* some loose pages, 139-142 together with two colour plates - LI - *Diplazium thelypteroides* and LII - *Diplazium pubescens* belonging to Volume 5. This small section must have been loose and dropped out without being noticed before the book was sold. Please check your copies and I will be happy to send the pages to the member who lacks them, along with my apologies.

New acquisition

BPS Booksales announce that the following book is now available - C J Goudey, *A Handbook of Ferns for Australia and New Zealand*. 1988, Lothian Publishing, Melbourne, Australia. £9.95. Send orders to: J W Dyce, 46 Sedley Rise, Loughton, Essex IG10 1LT. (This book was reviewed in *Pteridologist*, Vol. 1, Part 6, 1989).

J W DYCE

SENSIBLE CONSERVATION

J W DYCE, 46 Sedley Rise, Loughton, Essex IG10 1LT

The following extract is from an article by Robin Page which appeared in the *Weekly Telegraph* on Saturday 29 July 1989 -

"Sadly there is a growing belief in the conservation world that only eco-freaks know about conservation - people with PhDs gained from years of studying the rear left leg of some obscure centipede. As a result, many of the main-line conservationists I have met in recent years have alarmed me with their tunnel vision, closed minds and lack of common sense and practical experience."

I make no excuse for extracting the above paragraph from its context because it has a strong application, in the world of ferns, to the collecting of *varieties* - repeat VARIETIES, from the wild. I hasten to add that the criticism does NOT apply to ALL conservationists. I know many whose thinking is clear and logical, and who appreciate that wild varieties of any plant, be it daisy, fern or heather, etc., are very different from wild *species*. Unfortunately, they seem to belong to the *silent* kind of conservationist, and the ones who do the shouting and make all the protests are those with closed minds on the subject, who will not take the trouble to find out the facts about fern variation in the wild, - in other words, the kind so well described in my above extract from Robin Page's article in the *Weekly Telegraph*. If we listened to them our gardens today would be very much the poorer.

A large number of our wild plants, and not only British wild plants, have contributed many first-rate varieties which have been *conserved*, I repeat *conserved*, by their removal into gardens where they give pleasure to many - "conserved" in the wild they would have disappeared from our ken long ago. Very few varieties have the stamina to live long in the wild "jungle" in competition with the stronger-growing normal species forms. It is a fact - which I shall go on to demonstrate - that they seem to be incapable, with a few exceptions, of reproducing themselves in the conditions prevailing in the wild and remain "one-offs" until they disappear sooner or later. Yet, in the protected conditions of cultivation they flourish and readily reproduce themselves.

I shall now confine the rest of this article specifically to ferns, the plants with which I am most familiar. Several of the fern varieties we grow today are now well into their second century of life, and over the years have reproduced themselves generously, not only in their own form but in vastly improved forms, for it is a recognised fact that a fern plant which has mutated and broken away from the normal species form can elaborate the difference even more in its progeny, and this can be continued through several generations to finish up with superb plants which bear little resemblance to the simpler outlines of the original break. How very much our gardens would have lost during the past 150 years if our ancestors had been "conservation-minded"!

I will give some examples to illustrate the point I am trying to make, all of them first-rate plants well-known in the fern world and widely grown.

In 1861, in Stirlingshire in Scotland, a fine variety of the Lady Fern, named *Athyrium filix-femina* 'Victoriae', was found by a student named Cosh growing by the roadside near Buchanan Castle. It was a most remarkable plant and quite unique in the way it differed from the species shape. (See photographs opp. p 9). It was a fully-grown plant, upwards of 36 inches (90cm plus) high with a few crowns which the finder distributed, one of them going to the gardens of Buchanan Castle. Here the fern prospered, was propagated and distributed widely. That original clone is still with us today - I possess part of it. Unfortunately, none of its very numerous progeny quite approaches the original in quality, but it is very widely grown, not just in Britain.

A well-grown Lady Fern will produce *annually* well upwards of 1,000,000,000 (one thousand million) spores. (See my article in the *Bulletin*, Vol 2 No 5, 1983, pp 247/

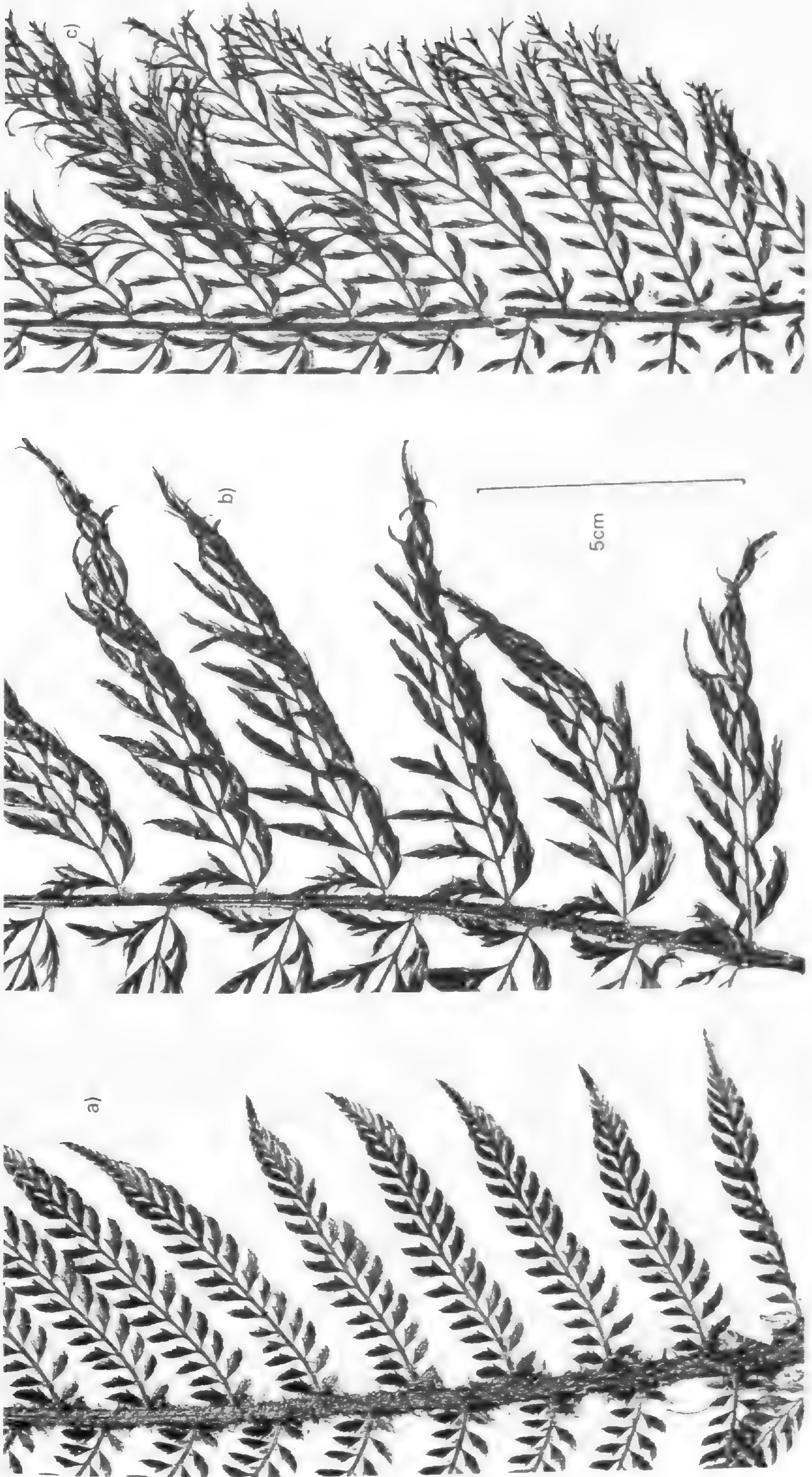


Fig. 1
a) *Polystichum setiferum* 'Plumosum Bevis', parent of b) and c).
b) *Polystichum setiferum* 'Plumosum Drueryii'
c) *Polystichum setiferum* (Gracillimum group) - raised by Cor van de Moesdijk

248.) The normal species, in the wild, will spore-propagate like weeds, even in the most unlikely habitats, but 'Victoriae', a fully-grown fertile plant which, over its years in the wild, must have scattered *trillions* of spores, never succeeded in establishing any progeny in the wild. Yet, in cultivation, it is one of the easiest of ferns to grow from spores. After its discovery many of the fern hunters of the day, including C T Druery, closely searched the area for miles around for any sign of a fern resembling 'Victoriae' - not only did they find none but, strangely enough, not even a normal plant of the Lady Fern could be found. Had 'Victoriae' itself been left *in situ*, would it still be there today, almost 130 years later? Your guess is as good as mine! Conservation for that fern meant getting it out of the wild into the protective conditions of a garden. Those of us who know the fern and grow it, and we are many, realise that our gardens would be very much the poorer without it.

I can cite many such examples demonstrating the ephemeral life of good fern varieties in the wild, all similar to the 'Victoriae' story. I shall restrict myself to two, both of them, like 'Victoriae', unique finds.

In 1876 a farm worker named Bevis noticed, in a Dorsetshire lane, a fern which seemed very different from the surrounding plants. Knowing that a well-known fern collector, Dr Wills, lived near by, he dug up the plant and presented it to the Doctor who immediately recognised it as one of the finest fern varieties he had ever seen. At the time it was thought to be a variety of *Polystichum aculeatum* because of its aculeatum-like dark glossy pinnules but now it is known to be a *setiferum* and is named *P. setiferum* 'Plumosum Bevis'. For 30 years the fern was thought to be completely sterile but was generous in its production of side crowns which were distributed widely among fern growers. Finally, spores were found but they consisted of single sporangia which could only be seen with the aid of a magnifying glass. Sowings of the spores produced sensational results and I illustrate here fronds from the parent and some of its progeny (see Fig. 1). Again, as a fully-grown plant in the wild it had not reproduced itself in any way and, if it had not been found by an observant man who knew what to do with it, it is *most unlikely* that it would be alive today in the wild over 110 years later, and another great gap would have appeared in the history of fern variation. Again, sensible conservation saved an unique fern from oblivion.

My third example is another find which has been repeated only once, again a fertile fern which must have scattered innumerable spores in its vicinity in the wild without any of them surviving to grow into ferns. Yet, in cultivation it has given us a large selection of good forms, similar to the parent, from its spores. It was a Lady Fern, originally found over 130 years ago in 1857 in Ireland by Mrs Frizell and named *Athyrium filix-femina* 'Frizelliae' (see Fig. 2). Fronds depicted here show the remarkable way the pinnae are curled up on themselves to resemble small green shells. Without having seen this fern no one could conceive of any fern adopting this shape, and again our gardens would have been much poorer if Mrs Frizell had been a "conservationist" and left the plant in the wild to linger on - for how many years?

One wonders how many other *unique* fern variations have had their little day in the wild and faded away before some observant individual could stumble across them and *conserve* them for posterity. Yet, the conservationists, with muddled thinking, would have us leave them to perish. First-rate finds continue to be made today by enthusiasts in our Society and some day another unique variety of another unimagined shape will be found - but *not* if conservationists of the wrong kind have their way.

I finish with the statement that nothing I have written here should be taken as referring to normal fern *species*, particularly the rare ones.

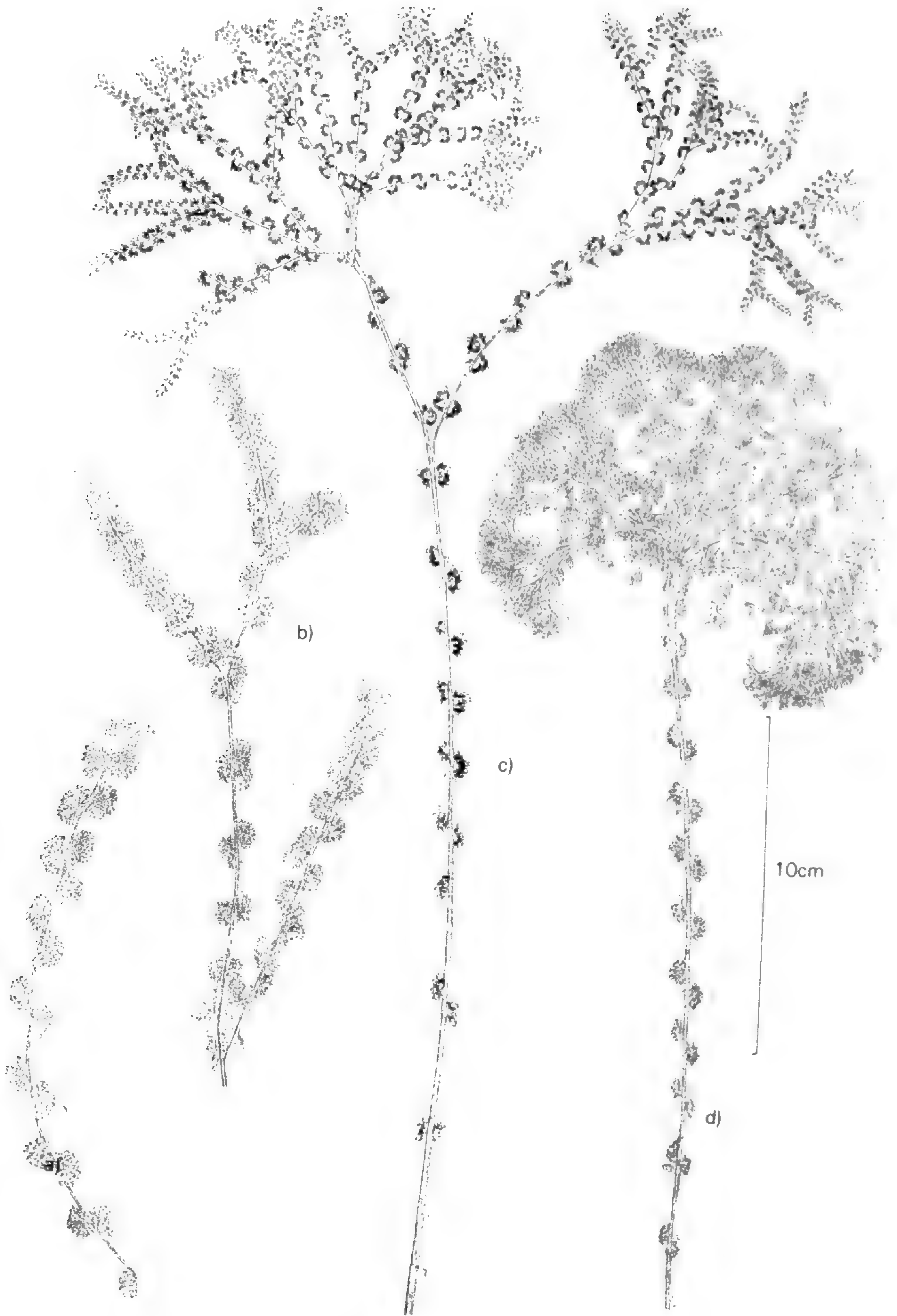


Fig. 2 *Athyrium filix femina* 'Frizelliae' and progeny b), c) and d).
a) *A. filix-femina* 'Frizelliae', original clone. b) *A. filix-femina* 'Frizelliae Ramosum',
c) *A. filix-femina* 'Frizelliae Multifidum', d) *A. filix-femina* 'Frizelliae Cristatum'.
All as illustrated in the *Jones Nature Prints* and reprinted in *British Ferns and their Varieties* by
C.T. Druery.

SOILS AND SOIL ANIMALS IN THE AGE OF FERNS

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Today, many large decomposer animals such as earthworms, woodlice and millipedes are found mainly in moist but not waterlogged, non-acidic soils containing nutritious plant remains. In these soils decay is rapid, the animals playing an important part in breaking down plant debris, and earthworms, in particular, in mixing the fragments with underlying soil. Fossils of some major groups of large decomposers are scarce or absent in deposits dating from the time when pteridophytes were dominant land plants, but the distribution of these animals today suggests that they may nevertheless have been present in ancient soils, assuming that early land plants provided an adequate source of food.

To examine this experimentally, the acceptability of a variety of modern ferns and horsetails to woodlice and earthworms was assessed. The common grey slater, *Oniscus asellus*, readily consumed most dead pteridophyte materials, especially when the plants were rapidly decaying. Earthworms quickly burrowed into and consumed soils containing dead fern and horsetail fragments, and the lobworm, *Lumbricus terrestris*, rapidly dragged pieces down into the soil, especially when decomposition was underway. *Asplenium scolopendrium*, *Dryopteris dilatata* and *Athyrium filix-femina* were especially palatable, *Equisetum arvense* and *E. palustre* very or moderately palatable, while *Polystichum aculeatum* was least preferred by the animals, probably because of its tough, spiky nature. The generally high acceptability of these modern pteridophytes to large soil animals is not surprising in view of the speed with which dead fern and horsetail fragments disappear in the field.

If we assume that some, at least, of the ancient pteridophytes were as palatable to soil animals as these modern ones, then it seems reasonable to suggest that large decomposers and well-humified soils may have been common in the "Age of Ferns" in moist but not waterlogged areas on base-rich rocks. Because of the rapid rate of decomposition in such soils fossilisation would have been rare, so that only peaty soils formed in the wetter regions have survived in abundance as fossils. However, further investigations are clearly needed into the acceptability of a wider range of pteridophytes to decomposers, and also into the kinds of soils and soil animals to be found under living pteridophyte vegetation.

(This note is a summary of one of the papers read at the BPS Indoor Meeting in October 1989).

THE LAND QUILLWORT IN THE CHANNEL ISLANDS

PATIENCE RYAN

Tamarisk Cottage, Albecq, Catel, Guernsey

In 1860 George Wolsey added the Land Quillwort (*Isoetes histrix*) to the British Flora, when he discovered it on Guernsey. It also occurs on Alderney where it is very scarce. It is unknown in the other Channel Islands, but is locally plentiful in Cornwall. Elsewhere in Europe it is recorded from the west coast of France to the Mediterranean, as far east as Turkey. This small flowerless plant grows flat on the ground; its narrow wiry green leaves arise from the base, and usually curl in a clockwise direction.

Nine populations of *Isoetes histrix* have been found near the sea on the north and west coasts of Guernsey and its immediate offshore islands. They occur in peaty soil on slightly sloping ground, either with underlying granite or more rarely in very short turf on sandy

soil. In both cases the ground is very wet in winter, and the plants die down when the land dries out, usually by the end of May. Most of the populations are close enough to the sea to get wind-blown spray.

During 1988 the estimated numbers of *Isoetes histrix* found in the Bailiwick of Guernsey, which includes Alderney's 30 or so plants, was 10,700. The largest concentration of plants is in an area of 17 metres x 1.5 metres, which is in a secluded part of a headland little used by people.

Plants associated with *Isoetes histrix* vary slightly according to the habitat, but moss is always present, usually together with *Chamaemelum nobile* and *Plantago coronopus*. In one lowlying site subject to flooding in winter, with a slightly different association of plants, the leaves of the *Isoetes histrix* can sometimes be 8-10 cm long.

The following plants are among some of the most common found growing with *Isoetes histrix*.

HABITAT	SITE 1	SITE 2	SITE 3	SITE 4
ASSOCIATED SPECIES				
<i>Aira praecox</i>		0		
<i>Anagallis arvensis</i>			0	0
<i>Anthoxanthum odoratum</i>	0			
<i>Armeria maritima</i>		0		0
<i>Carex flacca</i>	0			
<i>Chamaemelum nobile</i>	0	0		
<i>Erodium maritimum</i>				0
<i>Festuca rubra</i>	0			
<i>Juncus articulatus</i>	0			
<i>Luzula campestris</i>			0	
<i>Ornithopus perpusillus</i>			0	
<i>Plantago coronopus</i>		0	0	0
<i>Poa annua</i>	0		0	0
<i>Ranunculus flammula</i>	0			
<i>Scilla autumnalis</i>		0		0
<i>Trifolium ornithopodioides</i>			0	0
<i>T. pratensis</i>	0			
<i>T. repens</i>	0			
<i>Acrocladium cuspidatum</i>	0			
<i>Campylopus sp</i>		0		
<i>Ceratodon purpureus</i>				0
<i>Eurhynchium praelongum</i>	0		0	0
<i>Hypnum cupressiforme</i>	0			
<i>Pseudoscleropodium purum</i>	0			
SITE 1	Lowlying, subject to flooding in winter			
SITE 2	Damp peaty ground			
SITE 3	Very short turf, mainly moss.			
SITE 4	Drier patch, nearer rocks.			

DID THE DANES SHARPEN THEIR SWORDS AT EMBO?

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An unusual colony of *Equisetum hyemale* (Dutch Rush) was discovered by R.E.C. Ferreira growing in an uncommon habitat on calcareous sand-dunes near the village of Embo in Sutherland in the north-east of Scotland. The shoots throughout this colony are more slender and prostrate than the typical British form which is much thicker and more upright. This decumbent form is unusual and seems to be a genetically adapted sand dune ecotype. It is not known from anywhere else in Britain other than at this site. Page (1988: 118-119) noted the resemblance of plants at this site alone to Danish material which grows in similar habitats in Denmark.

While Denmark is geographically not very far away, the distance is perhaps too far to expect floating fragments of *E. hyemale* to survive. Experiments by Page and Barker (1985) showed that fragments could survive for up to three days in sea water and still grow thereafter. Evergreen horsetails in particular do grow very readily from vegetative fragments, but it also seems possible that this could be an ancient introduction. A reference by Thomas Pennant in his *Tour of Scotland* in 1769, opens an interesting line of speculation as to its introduction. He referred to a battle at Embo in 1259 between the Earl of Sutherland and the Danes (p. 168). During this period there were, of course, repeated attacks by Vikings, including the Danes, all round the coast, but especially in the north and west. This particular battle came near the end of a long series of raids in the immediate area which allows for many possible introductions. This, therefore, raises the possibility that the plant could have been thus introduced directly by this route from Denmark.

But why, one might ask, would the Danes want to carry quantities of *E. hyemale*? It has several uses. During the Middle Ages the Dutch Rush was imported from Holland for use in scouring and polishing (Page 1988:24). It was used like sandpaper and one can perhaps envisage that it was used for the necessary restoration of blades which had suffered from a damp sea-journey. Discarded fragments thrown overboard could easily survive long enough to be washed ashore and take root. As Embo is on the east coast it is perhaps helpful to imagine that the *E. hyemale* may have been freshly gathered shortly before leaving Denmark and had not been in transit long enough to have lost the ability to grow. This may account for its absence from the west where there are other suitable habitats.

A further possible use of this horsetail arises from an account in the appendix of Pennant's travels (p339) where the writer said that the invading Danes were all "cut to pieces". Another use of horsetails was for staunching wounds. *Equisetum arvense* was the usual species used for this purpose but *E. hyemale* may have been pressed into service especially at a battle site such as Embo. We will probably never know exactly how the plant was introduced. We can imagine some of the Danes escaping, without their leader who was killed, scattering fragments of *E. hyemale* as they fled. Or perhaps they were all killed and only their boat was left to rot among the sand-dunes while *E. hyemale* made itself at home? Perhaps there had been an occasion when a raiding party had buried their own casualties. It may have been thought appropriate to leave the slain with a supply of *E. hyemale* to polish their swords in the after-life, thus planting it for posterity. The colony grows quite near to the present village. If there had been an earlier settlement it may be that some of the Danes had colonised the area and deliberately planted the species.

Without a detailed genetic comparison a more precise link between this anomalous colony and Denmark cannot be absolutely proven. But there does seem to be a high possibility that the plant may have been introduced by Danish Vikings. By any of the above means the shoots took root and established a colony which has survived for seven

or eight hundred years. Any human Danish influence became incorporated into the local community, but this horsetail population seems to have retained its distinctive features.

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BOOK REVIEW

COLOUR IDENTIFICATION GUIDE TO THE GRASSES, SEDGES, RUSHES AND FERNS OF THE BRITISH ISLES AND N.-W. EUROPE by Francis Rose, 1989, 240 pp., 62 colour plates. Viking, London, ISBN 0-670-80688-9. Prices £35.

As the title says this book covers north-western Europe as well as Britain. In fact this means very little extra: *Marsilea quadrifolia* (illustrated) and *Diphasiastrum complanatum*, although *D. tristachyum* should also have been included as it is in Denmark at least. The author omits Norway and Sweden which one might have expected to be included.

There is some general chat about fern structures and life-cycle, and keys to the main groups (usually families) and then to species. Some larger genera (*Asplenium*, *Dryopteris* and *Equisetum*) are keyed out separately; close segregates may not feature in the keys but their diagnostic features are referred to in the text. Thumbnail sketches showing frond shape are given appropriately in the margins throughout the keys and make them easier to use. The main text is interspersed with 12 very fine plates of the majority of species, drawn mostly by Lura Mason. Unfortunately the excellence of the colour as seen on the originals has not been achieved by the printer and on the whole the plates are too yellow. For the most part they are accurately drawn although I believe the two filmy ferns have been mixed up: that labelled *Hymenophyllum wilsonii* has the broader and more yellow frond of *tunbrigense* albeit with perpendicular indusia of *wilsonii*. *Polypodium* is illustrated by one species only – said to be *vulgare* but looks more like *interjectum*. This is a case where all three species could have been illustrated with good effect.

The text itself is adequate and emphasises diagnostic characters in upper case. Hybrids are for the most part omitted, although well-known ones like *Equisetum x moorei* and *Asplenium x alternifolium* are mentioned. The nomenclature is mixed, following neither one nor other of the standard works. *Thelypteris thelypteroides* has been resurrected incorrectly and a new name coined for *Dryopteris submontana*: *D. villarii* subsp. *montana*, a typographical error, I suspect, but very misleading. Francis Rose admits in the *Introduction* to not following standard English names and to creating suitable names for non-British species. He had forgotten that the standard vernacular name given in Schedule 8 of the Wildlife and Countryside Act for the protected species *Equisetum ramosissimum* is 'branched horsetail' which is a more acceptable name than Rose's 'Boston horsetail'.

As the name of this book indicates ferns are only part of what the author and his artists are portraying; they are less than one sixth of the book – approximately £1 per page. I could argue that some of the colour illustrations are indeed worth that and if the book was priced £12 I am sure many fern enthusiasts would buy it. It is not, unfortunately, but if you consider you are getting some 200 pages on these other fascinating groups, you really cannot quibble. I make no apology for saying this to the readers of the *Pteridologist*. If you are garden-minded just look at the variation and attraction of many of the plants illustrated here and their potential for landscaping. If you are a botanist, I need say no more: you will want this book.

CLIVE JERMY

POLYSTICHUM SETIFERUM 'LINEARE HIRONDELLE'

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Lineare or *Linearum* is a kind of variation which can be found in several fern species. It is characterised by extreme narrowness in the pinnules but, unfortunately, is closely associated with depauperation in the fronds (see Fig. 1), which makes the majority of such varieties worthless. When this article was submitted to our Editor he sent it back with some suggestions - he usually does! - along with the pressed frond (Fig. 1). It was received from our member, Bridget Graham of Par in Cornwall, and is from a plant found in 1988 by Gillian Mathews. It represents a very typical form of *lineare* in *Polystichum setiferum* with very characteristic deficiencies. However, a few varieties do retain sufficient control to keep the fault, more or less, at bay and such plants have to be looked at very closely to discern any irregularity.

In the 1860/70s J Moly, living at Hawkchurch in Devon, was a very prominent and successful fern hunter in the West Country. Among the many good varieties found by him was *Polystichum setiferum* 'Lineare Hironnelle' which was considered by him to be one of his greatest prizes. So highly did he regard it that he never parted with any offsets - that unforgivable attitude adopted by so many possessors of unique plants, who fail to recognise the truth of the saying - to keep a plant give it away. The more a rare plant is propagated and spread around among other growers, the better are its chances of survival. Shortly before his death Moly disposed of his fern collection to W.B. Cranfield, our Society's president from 1920 until his death in 1947 - and another collector who did not believe in giving too much away. As the old fern collectors died he bought up their irreplaceable collections but made no provision for their survival after his death, apart from what can be termed a "token collection" bequeathed to the Royal Horticultural Society's garden at Wisley in Surrey. This was a mere drop in the ocean compared to the vast size of the fern collection he had amassed, and the ferns selected for Wisley (after his death) did not include any of the superb renowned varieties which had been acquired by him. Also, no provision was made for the collectors in our Society to get the opportunity to save them for posterity. This happened in the immediate post-war years when food was scarce; the garden was acquired for vegetable growing and the whole area was flame-gunned by the new owners. It was some time later before we learned what had happened. We must assume that 'Lineare Hironnelle' was among the multitude of unique plants which were destroyed, since nothing is known of it surviving today. We do know that Cranfield had the fern and that it bred true from its spores; the frond shown here (Fig. 2) was from one of his sporelings. It was depicted in the *British Fern Gazette*, Vol. 3, page 249, of March 1918. In spite of the 40 odd years which have elapsed since the collection was destroyed, I still "see red" when I think of that wanton senseless destruction.

It will be seen from the part-frond in Figure 2 that 'Hironnelle' was a very graceful fern, fully justifying Moly's high regard for it. The name is the French for *swallow* and it was well-chosen, for the pairs of opposite pinnules do closely resemble swallows in flight.

Some years ago our Editor, Martin Rickard, found a *lineare* variety of *Polystichum setiferum* in Moly's old hunting grounds. (*Bulletin*, 1980, p.78). A crown from this plant was presented to me and at the time we regarded it as merely a rather nice *lineare* type, to some degree approaching 'Hironnelle'. However, it should be noted that most good wild fern variety finds need some years to settle down in cultivation before they begin to show their true potential, and this year, nine years later, I was rather startled to see among my *P. setiferums* a very good *lineare* which strongly suggested 'Hironnelle' to me - but where did it come from? The label had got mislaid during the years since

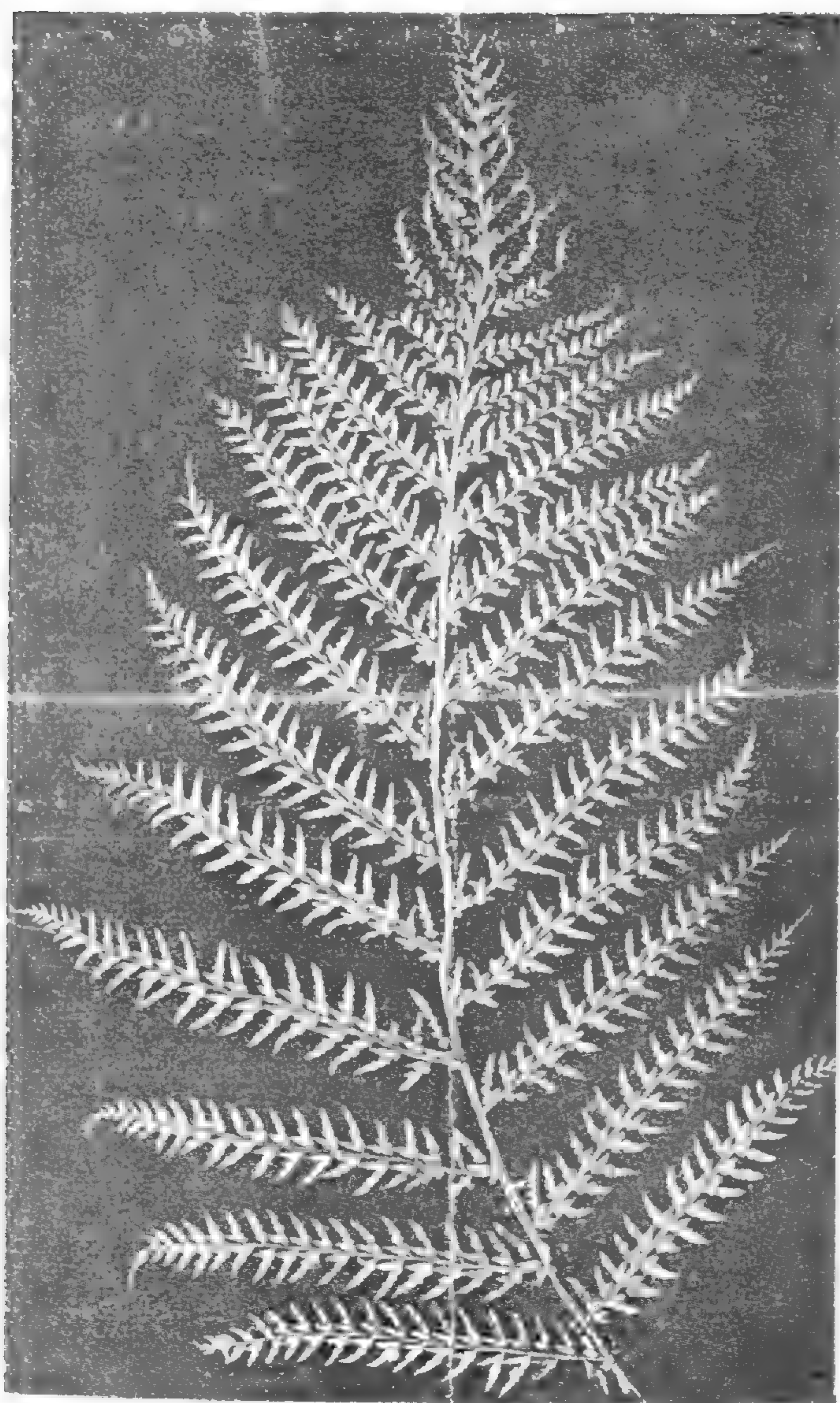


Fig. 1 Bridget Graham's *Polystichum setiferum* (Lineare group) 'Caruggatt'.

Fig. 2 *P. setiferum* 'Lineare Hirondelle'.

Fig. 3 *P. setiferum* (Hirondelle group) 'Chardstock', a) pinna from J.W. Dyce's plant, b) pinna from M.H. Rickard's plant.

I acquired it and the memory of it had faded. A phone call to Martin answered my question and memory flooded back. The pinnae shown here (Fig. 3, a and b) are from my plant and Martin's respectively. The slight differences result from differing growing conditions. To our knowledge this is the nearest approach to 'Hirondelle' we have in cultivation today.

Really good specimens of *lineare* are far from common in *P. setiferum* and I know of only one other, now deceased, which used to grow in the fern border in the Oxford Botanic Garden - and it was noticeably depauperate with many missing parts. Martin's plant is not completely regular throughout but it is a definite acquisition to our collections, although not up to the 'Hirondelle' standard. A look at the pinnae (Fig. 3a and 3b) shows it to be heavier in its build, with slightly wider and non-tapering pinnules but with the same serrated margins. The fern is very soriferous with large round sori which tend to bulge beyond the margins of the narrow pinnules, emphasising their serrations. This character can also be seen quite clearly in the 'Hirondelle' illustration.

SHORTER NOTE

Athyrium filix-femina (Setigero-percristatum group) 'Majestic'

This new sport appeared in my fern garden three years ago. I feel it is really an exciting development of the Lady Fern which might be named *Athyrium filix-femina* (Setigero-percristatum group) 'Majestic'. 'Majestic' because it appeared not far from a small group of *A. filix-femina* 'Setigerum Corymbiferum' which, however, does not exceed 30 inches (75 cm) in height, whereas my new variety reaches 43 inches (107 cm) by 8 inches (20 cm) abeam. The variety *A. filix-femina* 'Setigerum Percristatum' appears in Birkenhead's catalogue of 1892 as being 18 inches (45 cm) tall. So far my plants have not produced sori. I lifted the original clump recently and transferred it to another bed, after dividing it into the four crowns it had formed. The stipes and rachis are reddish in colour, contrasting nicely with the rich green pinnae.

No other setigerous sporelings have appeared in my garden so far.



Athyrium filix-femina (Setigero-percristatum group) 'Majestic' - mid section of frond.

REGINALD KAYE

THE GENUS *DICKSONIA* IN GARDENS IN THE BRITISH ISLES

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In the British Isles tree-ferns are only reliably hardy in the sheltered parts of South West England, West Scotland and around the coast of Ireland. In these areas many gardens boast specimens with huge brown fibrous trunks 3 metres (10 feet) or more high and 30cm (1 foot) or more in diameter. In most of these gardens the ferns are referred to as *Dicksonia antarctica*; however, very often, the English name is given as either Australian or New Zealand tree-fern, presumably indicating the origin of each plant. Unfortunately, this is immediately an impossible contradiction in names. *D. antarctica* does not grow wild in New Zealand, it is an Australian species. Therefore, if 'New Zealand tree-fern' really was imported from New Zealand it has to be either *D. fibrosa*, *D. lanata*, *D. squarrosa* or one of several *Cyathea* species, but certainly not *D. antarctica*.

D. lanata does not form an erect trunk except in subtropical conditions so can be eliminated. Its leaves are broad and lax, rather similar in outline to *Dryopteris dilatata*. For a superb colour photograph of this species see Firth, 1986. *D. lanata* does grow out-of-doors in Britain and can be seen at Inverewe in Scotland.

D. squarrosa can also be easily eliminated because it has a black narrow trunk, 10-15 cm in diameter (4-6 inches), often bearing lateral buds. Leaves are quite distinct with a rough, reddish brown stipe. This can be seen at Trebah and Trengwainton in Cornwall.

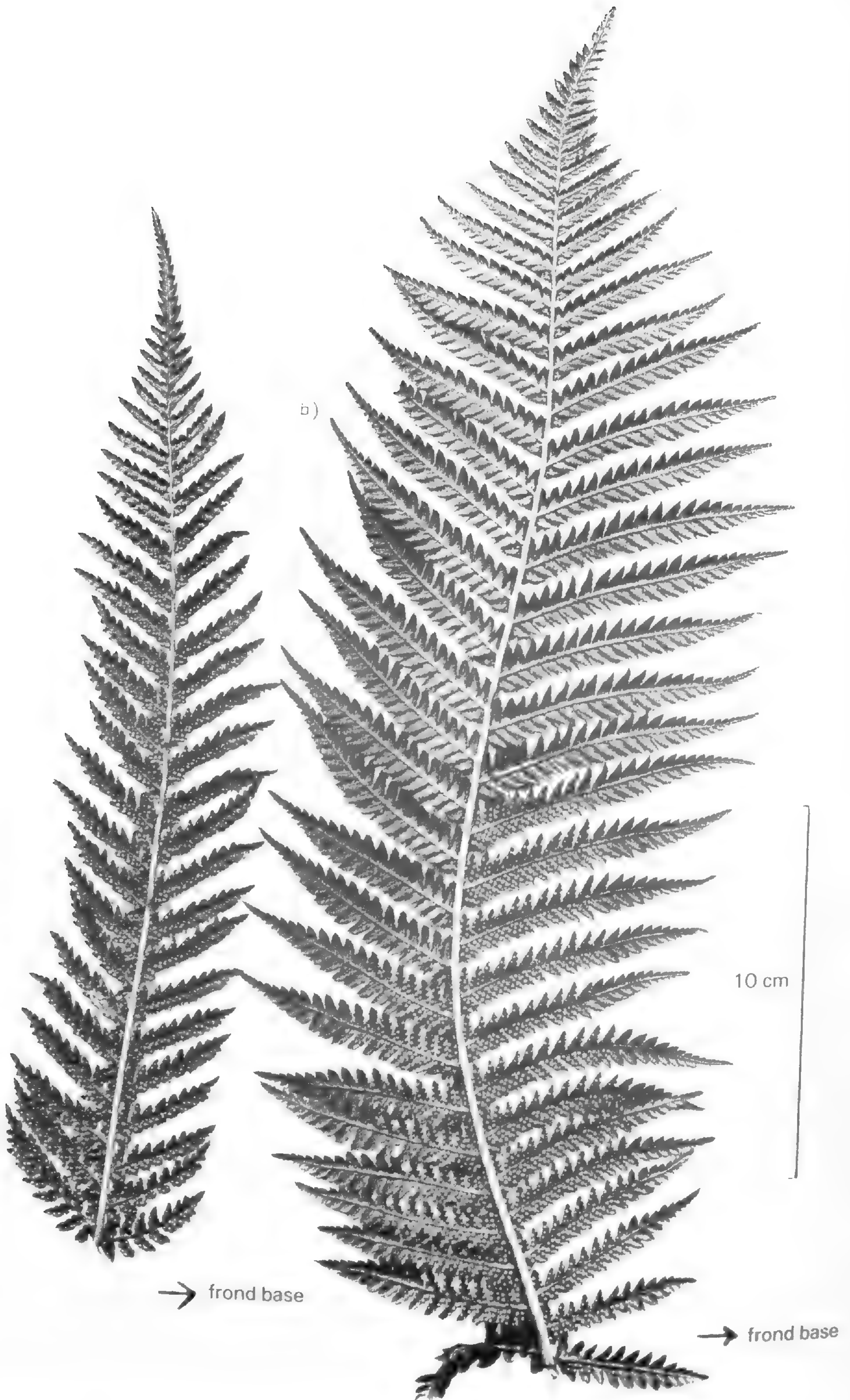
Finally, cyatheas can also be easily ruled out, as species grown out-of-doors in Britain have broad leaves with scaly stipes and non-marginal sori quite different from any hardy *Dicksonia*, and *Cyathea* spp. with trunks are very rare out-of-doors in the British Isles.

We are therefore left with the probability that as sometimes suggested 'New Zealand tree-fern' of British gardens is *D. fibrosa*. Certainly this species is known to be superficially very similar to *D. antarctica*, so much so that some authorities want to treat them as sub-species or varieties of the same species. What, therefore, is the situation in British gardens? Are the tree-ferns we see *D. antarctica* or *D. fibrosa*?

Unfortunately, very few, if any, books give a reliable means of distinguishing between the two species. *The European Garden Flora*, Walters et. al. (1986) could have been more helpful and the dichotomous key separating the two species is of little help except with very mature specimens.

The trail of trying to sort out these two species started to clear for me when, during a visit to Savill Gardens in 1987, I saw mature labelled specimens of both species growing side by side in the Temperate House. With permission from John Bond, Keeper of the Gardens, I picked a pinna from each specimen and kept them for reference. Apart from the pinna of *D. antarctica* being much the larger I could not, however, really put my finger on any key difference between the two samples.

Since Spring 1986 I have been growing a dicksonia in my garden. This fern was given to me as a young trunkless specimen by gardeners at Glendurgan in Cornwall. It has thrived but as it was slow to produce a trunk I actively searched all possible sources for a specimen with a trunk at least two feet tall, as such a plant would reputedly be hardier. In this I drew a blank as most outside populations had suffered badly in the winter of 1986/87. Fortunately, one of our British Pteridological Society members, Christopher Fraser-Jenkins, took up my quest during a tour of south-west Ireland. At one garden, Kells House by the shores of Dingle Bay, he was successful and very kindly



Pinnae from broadest part of fruiting fronds of two species of *Dicksonia*. Both plants in cultivation at Leinthal Starkes. a) *D. fibrosa*. b) *D. antarctica*.

collected a magnificent specimen of *Dicksonia* with a trunk two feet nine inches tall (c 80 cm). (Fortunately, he drives a Volkswagon camper - it would not have gone in a normal vehicle; with leaves and roots the whole package was 10 feet long!)

This Kells House specimen was safely installed in my garden alongside the Glendurgan plant. Both have thrived, each producing spring fronds 5 feet 9 inches (173 cm) long. However, a year later, once acclimatised, I realised that the two plants are very different. The Glendurgan plant has narrow leaves and narrow pinnae which do not, or only rarely, overlap, while the Kells House plant has broader leaves with pinnae overlapping so that alternate pinnae are almost touching.

Comparison of pinnae detached from the two specimens (see illustration) with New Zealand fern floras (eg Dobbie and Crookes, 1952) and books of pressed ferns make it clear that the narrower pinna is *D. fibrosa*. The broader specimen similarly matches with *D. antarctica* in Australian literature (e.g. Bailey, 1892), as well as with the Savill Gardens' plant of this species.

In the light of the above it is clear that both *D. antarctica* and *D. fibrosa* are grown in gardens in the British Isles. At the moment I can only say that *D. fibrosa* is grown at Glendurgan, but I suspect many other Cornish specimens will turn out to be *D. fibrosa* and hence so will many young plants bought in nurseries. Conversely, are all Irish specimens *D. antarctica*? I doubt it, but at present it does seem that there is a better chance of finding *D. antarctica* in Ireland.

Suggested features for separating *D. fibrosa* and *D. antarctica*:

	<i>Dicksonia fibrosa</i>	<i>Dicksonia antarctica</i>
Frond:	Narrow	Broad, particularly in the third quarter from the base.
Ratio, length: breadth (approx.) (based on fronds 173cm long)	6 : 1	4½ : 1
Pinnae:	Narrow, usually not overlapping	Broad, often strongly overlapping so that alternate pinnae almost touch
Ratio, length: breadth (approx)	4½ : 1	3 : 1
Pinnules:	Pinnules longest at base of pinna, particularly acroscopic ones	Pinnules usually longest in middle part of pinna.

The reliability of these characters has not been fully evaluated in the field. Any comments on their usefulness would be gratefully received.

Acknowledgement

I would particularly like to thank Dr Patrick J. Brownsey of the National Museum of New Zealand for many constructive comments on the draft of this article.

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GROWING THE KILLARNEY FERN

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'In the spring of 1843 I received a small portion of *rhizome* some five or six inches long, which I placed in a bell-jar about fifteen inches diameter. In December 1846 it quite filled the glass, and in that month I removed it into a case 3 feet 10 inches by 2 feet 6 inches, and 3 feet 4 inches in height - ... the plant now (3 August 1852) nearly fills this case'.

- Letter to Nathaniel Ward from Robert Callwell of Dublin. Quoted in Ward's *On the growth of plants in closely glazed cases*, 2nd ed.

The Killarney Fern (*Trichomanes speciosum*) is not easy to grow and, like many plants, it can, for no apparent reason, begin to sicken. It is also not easy to find out what it likes; being so rare and with its localities closely guarded secrets, you cannot visit it in the wild and inspect the rocks, humidity and light levels to check if you have got these right, and it is, of course, heavily protected by law. It may reach its northernmost point in Argyll and, from what I have heard travellers say, it is more common in France and Spain. It obviously enjoys an oceanic climate, but from descriptions of it in cultivation it has been grown in a wide variety of humidity and light levels. The Victorians commented on how it did not spore in cases but often grew more luxuriantly due to the congenial atmosphere.

I noticed what looked like the beginnings of fertility on one frond on my plants in December 1988, tiny dots at the vein ends, which gradually swelled and darkened. Over the next few months further fronds followed while the earlier ones looked as if tiny cigars grew on them. By April 1989 it seemed that almost all the fronds of one clone were fertile. The bristles resulting from the development of the sporangia are not easy to see.

I have grown *Trichomanes* since about 1963 when Reginald Kaye sent me a bit (originating from the Chelsea Physic Garden) and about a year later I got a large sheet of trimmings from the filmy fern house at Glasgow Botanic Gardens, which was very different from Reg's. His is slower to increase, more prone to sudden collapses and has narrow upswept fronds; the Glasgow plant (origin unknown but we like to think it might have come from Arran or Loch Fyne-side) is very fast growing, more robust and almost foliose. A year or two ago I acquired a very small dense form originating in the old Liverpool Botanic Gardens (now no longer existing); this did poorly but when put in a carboy has shot away and become more like Reg's which could be var. *andrewsii* of Newman. Both the Glasgow plant and Kaye's have kept their characters in a wide variety of conditions. (See photographs opposite page 40).

My first case had no earth-box. A handyman ran it up from red cedar and plate-glass, shaped like a giant pencil-box, the roof being the lid. A life-boat buoyancy tank (you would be surprised at the things for sale in Scotland's first container nursery!) made a good but rather deep earth-box. The same man made my second case, an oak-framed one with sliding doors at the front and a lift-off lid-roof. This allowed space for a proper bed of compost and lumps of rock and, being much larger, allowed the ferns to grow without touching the glass. The first case was passed on to Anne Ashberry who runs a miniature plant nursery in Essex.

The ferns did particularly well in a south-facing bedroom along its west wall with a gable end nearest to the light but shielded from the glare by the curtains. They increased sufficiently for the overflow to go into a carboy. In those days you could buy a real giant carboy in palest green glass, not like the unsatisfactory too dark bottles sold for plants today, for only 63 shillings (£3.65); now, in the Glasgow area at least, they are £15.00 if you are lucky enough to spot one. In the carboy the Glasgow fern flourished, rambling over the chunks of red sandstone I got from here and there along the Clyde

coast, till one day a visitor said I should seal the top. The lid consisted of a wine glass broken at the top of the stem, set right way up in the neck of the carboy, by no means a tight fit. What possessed me to listen to this advice I do not know. I had to be away for two weeks and returned to a disaster. The seal had been too much for three large earthworms that I did not know lived in the bottle; their deaths made gasses and the ferns were very sick. I had to wash them along with the rocks and begin again. It took many years for them to recover.

I moved out of town to a cottage which had a generous space in the bend half-way up the stairs, with a large skylight over it. This north light with glimpses of the morning sun pleased the *Trichomanes* in the carboy and the frond size increased to about 8 inches (21 cm) with little watering and again with a broken wine glass seal. The fronds were constantly beaded with moisture from the enclosed humidity and were a source of interest to visitors walking upstairs. The main colonies I moved into a real wardian case, or perhaps it should be called a warrington, being a hybrid aquarium/plant case. This was set at the top of the stairs and got a little more light than the bottle. I missed having the fern so close to my bedside, as having it visible from my pillow made me aware of how true Dr Ward's views on encouraging invalids must have been by giving them a few ferns under a dome or a mini-case at their bedsides. I think any fern lovers forced to be prone for a few weeks would enjoy such a sight. The only other fern I tried with it was the Sea Spleenwort (*Asplenium marinum*) which lived nine years before it died. This fern was one recommended by Victorian authors as a companion plant for the Killarney Fern.

When I moved back into Helensburgh about eight years ago the fronds were starting to touch the glass of the warrington case but I had a wonderful replacement to hand. The cottage had a vast sash-window in the (north-facing) kitchen and I had a reproduction window-case made of galvanised steel to fit over the lower half and all the plants did well due to overhead light. The kitchen gets morning sun but only in heat-waves do I need to protect the ferns with a yellow-green net window-curtain. They seem able to tolerate mobile gas heaters though these are not used much. They do not mind the glass being cleaned with Windowlene, but if the case had to be repainted I would move them back into the oak-framed case. They are a lot less sensitive than *Leptopteris* which expires at a puff of gas and cannot bear tobacco smoke or household chemicals - I know, I lost a couple!

I do not think the Killarney Fern is much bothered about composts as long as they are well-drained, damp-retentive and acidic, and the same applies to the rocks. I crock the base well with broken clay pots, hump side up, then add a layer of sphagnum moss or fibrous peat to stop the compost working down. Pieces of charcoal and sandstone are mixed with the compost, more or less as recommended in Kaye's *Hardy Ferns*. I think this fern prefers to creep over rocks rather than soil; at least in my experience it does, so initially I tie the rhizomes with sewing-thread on to chunks of sandstone gathered from the coast. These have been left a good many months in the garden in case they are impregnated with anything, such as salt spray, which would upset the fern roots.

Until I read Chris Page's book *The Ferns of Britain and Ireland* I did not know that the Killarney Fern liked acid conditions. The sandstones of the Clyde area vary a lot in their *pH*, which may explain the odd sudden die-back here and there. This happened a year after my plants had been settled in their new house. Slowly the tips of the fronds went brown and crisp and I thought possibly the rhizomes were sick and would need to be started up again with fresh rocks and compost. When I tried to lift a large portion of the Glasgow plant up it was as firmly attached to the rocks as ivy to a wall, so they were only given a few new rocks and a top-dressing. The dead parts were cut

off and they seemed to improve very rapidly. A problem the books say nothing about is some rocks exude salts such as you find on old clay pots and the Killarney Fern dislikes meeting them. But getting stuck-down rhizomes off rocks to put in fresh ones is not easy as they stick hard and are brittle. I do not syringe the ferns; usually when the rocks are dry I use an atomiser set at "jet" as the rock surfaces become almost waterproof. In high summer, if the whole case looks dry they get a house-plant can of tepid water (acid and lead-enriched!) all over. The Killarney Fern does dislike being in stagnant water so I encourage the rhizomes to go along the upper surfaces of the rocks where they do best. I have noticed that rhizomes creeping too low do a lot less well.

Someone, on seeing my fern cases, once said it was very obvious I was a true pteridophile - I had got my priorities right; ferns first, house long way behind!

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BRITISH FILMY-FERN GAMETOPHYTES

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The Hymenophyllaceae are known as the filmy ferns because their membraneous leaves, but for the veins, are only a single cell thick. While predominantly tropical, there are three species in the British flora. *Trichomanes speciosum*, the Killarney fern, is a moderately large fern which grows only in extremely sheltered "rock houses" and steep gorges, usually near permanently running water. Always a rarity in the U.K., confined to western Britain and Ireland, it is now exceedingly rare and protected by law. The other two British filmy ferns are *Hymenophyllum tunbrigense* and *Hymenophyllum wilsonii*; Tunbridge and Wilson's filmy ferns respectively. These species are rather more common in western Britain and Ireland, but always a treat to find clinging to rock faces and bases of trees alongside fast-flowing streams and deeply shaded gorge habitats.

Hymenophyllum species illustrate another special character of many filmy ferns, that of growing in the manner of bryophytes; their threadlike rhizomes twine over rock or bark surfaces and produce a dense mat of small leaves which grow among, and often exclude, bryophyte cover. Their prothallial or gametophyte stages are similarly bryophyte-like. Whereas upon spore germination most ferns produce a simple heart-shaped prothallus, each in the wild attaining at most the size of one's small fingernail, the gametophytic stage of filmy ferns can become considerably more extensive. More importantly, whereas other fern gametophytes die after producing the new sporophyte generation, gametophytes of filmy ferns are perennial.

Instead of growing as a single unit as do gametophytes of most ferns, filmy fern gametophytes branch repeatedly to form mats of prothallial tissue resembling mats of small liverworts (e.g. of the genus *Riccardia*) in the case of *Hymenophyllum*, or wefts of algae (e.g. *Cladophora* or *Vaucheria*) in the case of *Trichomanes*. The latter is especially peculiar among ferns in that it is composed entirely of a network of branched filaments. In both genera, the gametophytes grow and branch indeterminately and may cover areas of 10 to 100 cm².

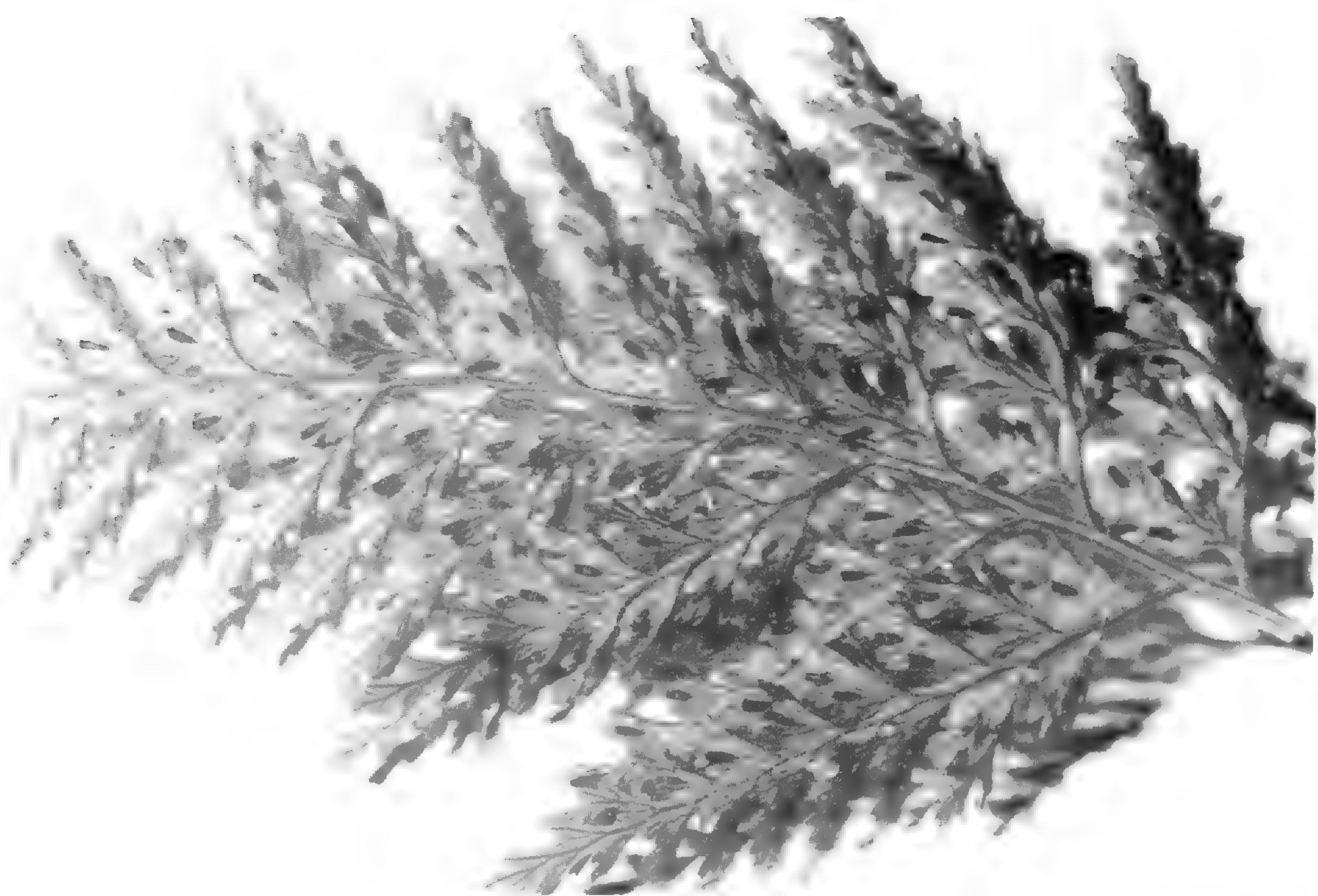
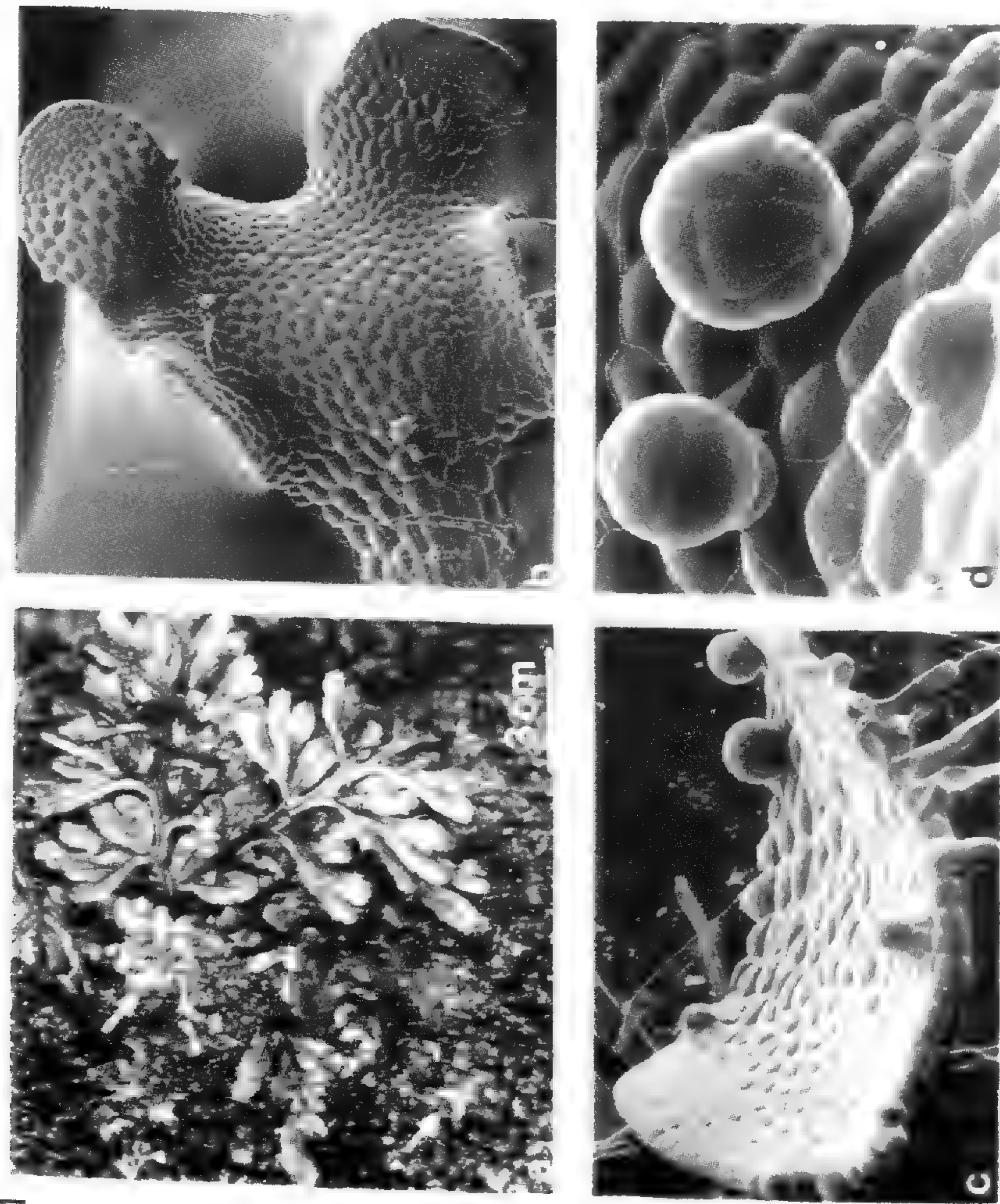


Fig. 1. Close up of frond of *Trichomanes speciosum* Plant originally from Chelsea Physic Garden (Photograph by Allan Mc G. Stirling).

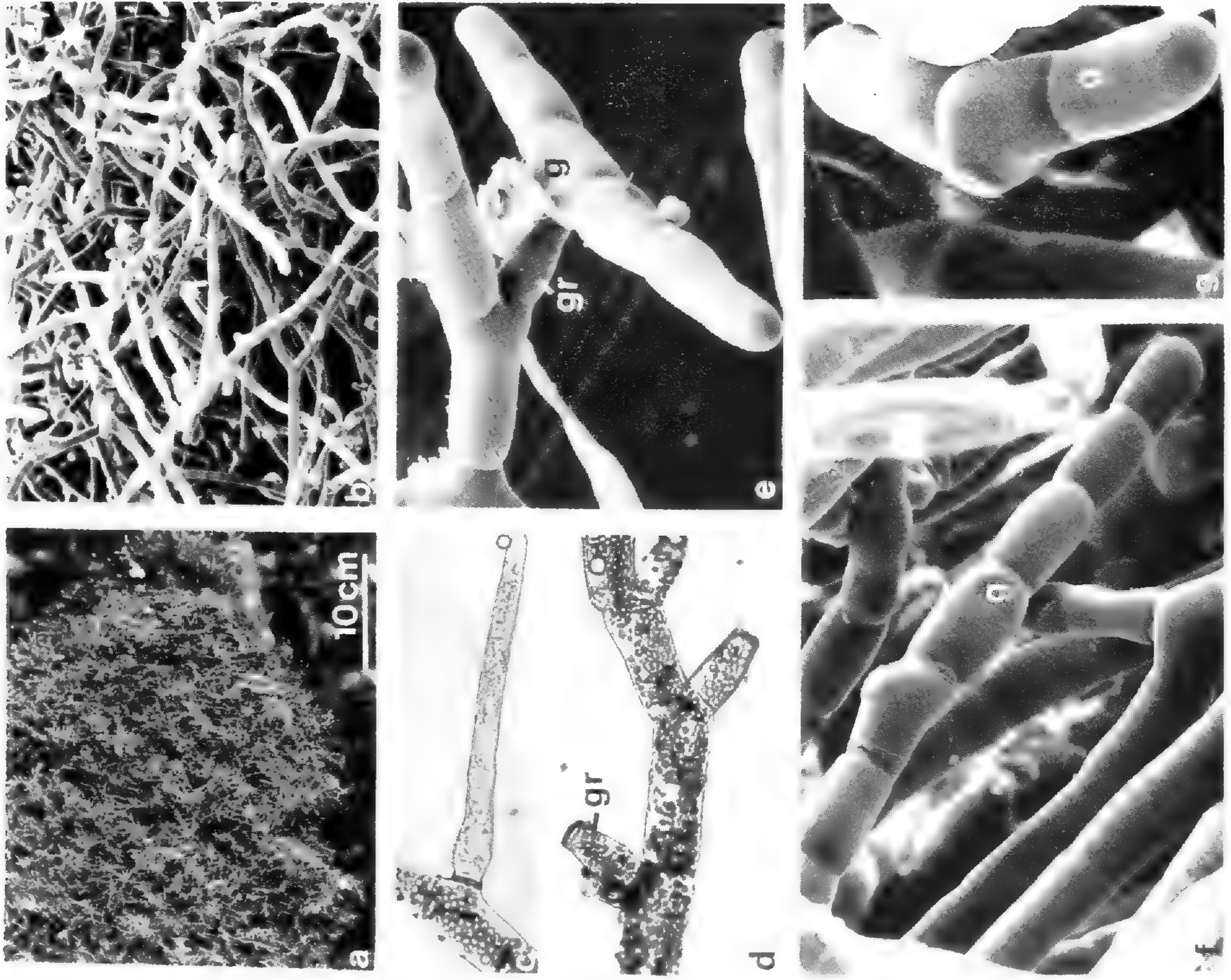


Fig. 2. *Trichomanes speciosum* growing in Wardian Case. Plant originally from Glasgow Botanic Garden. (Photograph by Allan Mc G. Stirling)



1. *Hymenophyllum tunbrigense*

- a) Gametophytes (e.g. arrows) and sporophyte.
- b) Gametophyte, x48.
- c) Antheridia and developing archegonia, x95.
- d) Detail of antheridia, x270



2. *Trichomanes speciosum* gametophytes

- a) Habit
- b) Habit, detail, x44.
- c) Filament and rhizoid, x220.
- d) Filament bearing gemmifers (e.g. gr), x200.
- e) Gemma (g) borne on gemmifer (gr), x240.
- f) & g) Detached gemmae (g), f x235, g x420.

2

1

Growing in this manner, gametophytes of the Hymenophyllaceae may persist indefinitely *and independently of the sporophyte generation*. In the northeastern United States where they have been studied extensively (Farrar, 1985), at least one species of *Trichomanes* and one of *Hymenophyllum* exist solely as gametophytes more than 1000 km from sporophytes of their species. In both these species, gametophytic persistence is further enhanced by the production of gemmae. These are multicellular vegetative units, specialised for dehiscence from the parent thallus, with the capacity to establish new gametophyte colonies.

During the autumn of 1989 we made a concerted effort to discover gametophytes, and to determine the extent to which the British species of filmy ferns may occur as independent colonies. We are pleased to report success in finding gametophytes of all three species, and do so with the hope of encouraging further study of this phenomenon in Great Britain.

Our first discovery was of gametophytes of *Hymenophyllum tunbrigense* in North Wales. These we found growing in dark moist recesses in vertical cliffs which also supported abundant growth of sporophytes of the species. The gametophytes formed colonies mostly about 10 cm² and were found to be producing numerous young sporophytes by sexual reproduction. Also in North Wales we found similar occurrences of gametophytes of *H. wilsonii*, again in the vicinity of sporophytes of the species. These, however, were not producing young sporophytes.

Neither of the British *Hymenophyllum* gametophytes have shown evidence of reproduction by gemmae. An earlier study of *H. tunbrigense* gametophytes also reported an absence of gemmae (Janczewski and Rostafinski, 1875). Gametophytic gemma production is a specialised characteristic in ferns and as the British species are among the more primitive of the genus, we suspect gemma production may indeed be absent from these species. This may account for our failure to find more extensive gametophyte colonies of these species and to find them outside the immediate environs of their sporophytes.

On the other hand, gametophytes of *Trichomanes speciosum* do produce gemmae and do occur well beyond known occurrences of the sporophyte. We found independent gametophyte colonies of this species in nine different sites in the Lake District, the Yorkshire Dales and North Wales, in only two out of which the sporophyte has been recorded (in both it is now apparently absent). These occurred as wefts or mats of gametophytes covering up to 100 cm² of rock surface. Generally they occur in deep, dark, humid grottoes in non-calcareous rock. In North Wales and the Lakes, these rocks were volcanic; in Yorkshire they were millstone grit. In such habitats the gametophytes seem to occur where the light intensity is too low for growth of most bryophytes. Indeed, one has little chance of observing them without the aid of artificial light.

Our rate of success in finding *Trichomanes* gametophytes was such that we suspect they may be widespread across Britain and Ireland in habitats similar to those described above. This is especially significant for this rare and protected species. Though we have not yet observed gametangia or sporophyte production in the gametophyte colonies we observed, the potential should remain for these plants to reproduce sexually and to restore sporophytes of *T. speciosum* to areas where they have been extirpated in historic or prehistoric times. In the meantime it is rewarding to know that *T. speciosum* probably still occurs in some abundance throughout its previously recorded range, albeit as the gametophyte generation alone.

Description of British Filmy Fern Gametophytes

Hymenophyllum

These occur as mats of branched ribbon-like prothalli up to 3cm long and 0.5cm broad (see Figs 1a & b). They can be differentiated from liverworts by being everywhere only a single cell in thickness, whereas similar sized liverworts either have a distinct midrib

or are generally more than one cell thick. *Hymenophyllum* gametophytes are further distinguished by their male and female gametangia (antheridia and archegonia) which occur on the undersides, near to the margins of the prothallus and are typical of ferns and markedly unlike those of bryophytes (see Figs 1c & d). Gametophytes of *H. tunbrigense* and *H. wilsonii* cannot readily be distinguished from one another except by chemical methods such as enzyme electrophoresis or by the presence of attached young sporophytes.

Trichomanes

The much branched filamentous mats of *Trichomanes* are, at first sight, similar both to some species of green and yellow-green algae, and to the protonemal stage of mosses (see Figs 2a & b). They differ in the possession of short brown unicellular rhizoids, gemmae and gemmifers (the specialised cells upon which gemmae are produced) of the type illustrated in figs 2c - g), all of which are visible with a hand lens. Under the microscope they can be differentiated from algae by the fact that *Trichomanes* filaments are regularly divided into cells never more than 3 times longer than broad, with each cell containing numerous discoid chloroplasts (see Fig. 2c) (Filamentous algae have 1 to 4 very large chloroplasts or, if they have many small chloroplasts, have cells that are much longer).

The authors would like to thank Clive Jermy, Nigel Brown and the staff of the Nature Conservancy Council for their help with this study; and would welcome information on the suspected occurrence of filmy fern gametophytes. It should be stressed that the law does not permit the collecting or disturbing of *Trichomanes* gametophytes or sporophytes, and specific locations cannot be disclosed except to authorized persons.

References

- FARRAR, D.R. 1985. Independent fern gametophytes in the wild. *Proc. Roy. Soc. Edin.* 86B: 361-369.
- JANCZEWSKI, E. and J. ROSTAFINSKI. 1875. Sur le prothalle de *L'Hymenophyllum tunbrigense*. *Mem. de la Soc. Nat. des Sci. Nat. et Math.* Cherbourg 19: 89-96.

BOOK REVIEW

MOSSES, LICHENS AND FERNS OF NORTHWEST NORTH AMERICA by Dale H Vitt, Janet E Brown & Robin B Bovey. Pp. 288, 410 colour photographs, 35 b&w illustrations 215 x 128 mm. University of Washington Press, 1988. US ISBN 0-295-96666-1. Price \$17-50, paper only.

Only 28 of the 100 species of ferns and fern allies known from northwestern North America are included in this book. It is therefore clearly not a book for the fern specialist. In fact, it is a general field guide to the common mosses, liverworts, lichens and ferns growing in the area.

There are general introductory chapters and keys to species before each systematic section. 170 mosses are listed (of 900 known in the region), 156 lichens (of 1200) and 20 liverworts (of 250) as well as the 28 ferns and fern allies. Overall the book deals with about 15% of the terrestrial green cryptogams of northwestern North America.

Every species included is allocated half a page. Each is illustrated in colour by photographs about 5cm square; most are of good quality. A distribution map and indication of habitat preference is given, as well as some general notes on each species that might be relevant in the field.

This is a very useful book bound in stiff card of a size to fit easily into most pockets. It will be of great value to the amateur North American naturalist with a general interest in cryptogams.

MARTIN H. RICKARD

COLLECTING FERN SPORES

A. R. BUSBY

16 Kirby Corner Road, Canley, Coventry

Collecting fern spores is a relatively straight-forward task as long as a few simple rules are followed. Normal species usually provide normal spores which, when grown on a suitable compost and given a little warmth and light, will germinate readily. Most hybrids produce abortive spores which will not germinate. Hybrid spores are easily recognised, if they are examined at around 100x magnification they will appear white and somewhat wizened. Healthy spores have a uniform shape, often round or similar to the segments of an orange. They will vary in colour according to species: i.e. yellow, black, brown or green.

Spores of Garden Ferns

Hardy ferns in British gardens usually produce their spores from June onwards. When the spore cases are ripe they will appear light brown and often show the colour of the spores inside - *Polypodium* = yellow, *Athyrium* = black, etc. Another indication that the spore cases are ready is that the protective scale, the indusium, will have withered or completely disappeared to give the spore cases room to dehisce. A hand lens, preferably with a 20x magnification, is useful for checking the condition of the spore cases on the frond. Remember, if the spore cases have a ragged appearance and/or if there is lack of spore colour, the spores have probably already dehisced.

In most cases two or three pinnae will provide an ample quantity to sow. Simply place the pinnae in a paper envelope and keep it somewhere warm and dry for a day or two. Never use polythene bags as any trapped moisture will delay or even prevent the spore cases dehiscing. After a day or so give the envelope a few flicks with a finger to ensure that the spore cases have opened and that a dusty deposit, including the spores, is in the bottom of the envelope. The pinnae themselves can be discarded. If there are no spores then the pinnae were either picked too late, and the spores have gone, or too soon.

Indoor Ferns

The spores of tender indoor ferns are available almost all the year round, although during the short days of winter fewer fronds are produced. Nevertheless, the technique for collecting hardy fern spores applies equally to indoor ferns.

Cleaning Spores

I do not consider it essential that spores are separated from other sporangial debris but there is always the possibility a contaminant may be introduced and cleanliness is going to increase the chances of a successful spore sowing. To clean the spores brush (I always use an artist's natural bristle paint brush) them onto a sheet of paper. I find newspaper excellent for this, but any type of non-shiny paper can be used. Slowly tip the paper on edge, the heavier sporangial debris will fall off the paper while the much smaller fern spore will adhere to it. A small quantity of spore may be lost but what is left will be more than adequate for most needs. Next, carefully fold the newspaper in two and tap gently, this traps the spores along the crease and they can be brushed onto a crock saucer. (Not plastic as any static electricity present will render the spores uncontrollable.) To sow them, gently brush a small quantity onto the surface of the compost.

The Longevity of Fern Spores

The longevity of fern spores is often discussed between growers and involves much speculation rather than hard fact; certainly, green spore from such genera as *Osmunda* and *Ophioglossum* have a very short life, perhaps a matter of only a few days. However, I often supply spores of *Osmunda* to various parts of the world by airmail post and have never received any complaints concerning lack of germination. The spores of other

genera may remain viable for weeks or perhaps even months. I recommend that we ignore all this and obtain spores as fresh as possible and sow immediately.

Storing Spores

I have one recommendation on this - DON'T! Fern spores are much better off on the surface of the compost rather than languishing in an envelope. Of course, spore from the Society's Spore Exchange have to be stored and because of this the Society cannot guarantee the viability of the spores that are freely given. (But most grow - Ed.)

The Society's Spore Exchange Scheme

When collecting fern spores please do not forget our Spore Exchange Scheme. While collecting one or two pinnae why not press the entire frond between sheets of newspaper? The surplus spores, carefully named and fully labelled, will be gratefully welcomed by the Organiser, Margaret Nimmo-Smith. Even our most common species are in demand by our overseas members.

I wish you every success with your endeavours.

BOOK REVIEW

INDEX HORTENSIS VOLUME 1: PERENNIALS. Compiled and Edited by Piers Trehane. Pp. 504. 216 x 125mm. Quarterjack Publishing, Wimborne, 1989. ISBN 0 948117 00 1. Price £25 (hardback) from Quarterjack Publishing. Hampreston Manor, Wimborne, Dorset, or major booksellers.

In reviewing this book I must come clean and admit that I, along with Alison Paul at the Natural History Museum, was given a sight of the fern sections prior to publication. Nevertheless, as the overall style and the vast majority of the input on ferns is the work of the author alone, I hope I can comment fairly on this book.

It was indeed unfortunate that a critical list of garden plants was being produced at a time when fern cultivar nomenclature was in a state of flux. It is inevitable, therefore, that since publication one year ago some names (3) have to be changed to conform with the International Code for the Nomenclature of Cultivated Plants (ICNCP). These are, with suggested alternatives:

Athyrium filix-femina 'Bornholmiense' - varietal name now changed to 'Bornholm'.

Athyrium filix-femina 'Crispum grandiceps Kaye' - now (Grandiceps group) 'Kaye's Crisped'.

Polystichum setiferum 'Broughton Mills' - now (Congestum group) 'Broughton Mills'.

One other change in the ICNCP is the need for all words in cultivar names to begin with a capital letter, hence 'Crispa congesta' now becomes 'Crispa Congesta' etc. This rule is relatively recent and has not previously been applied to ferns. It is possible that in the next revision of the Code the word 'group' will also have to have a capital initial letter.

Despite these minor problems this book will, I believe, be of immense use to all dedicated gardeners. It will inevitably be compared with the also excellent *Plant Finder*, but *Index Hortensis* differs from that book in not giving a guide to individual nursery's stock, but instead a much fuller guide to the nomenclature of garden plants. This includes:

More synonymous names for cultivars and species.

Usually a fuller list of cultivars and species. Over 20,000 perennial taxa are listed.

Guide to the growth form of many plants and where further information can be found, including good illustrations.

Authority for the name of all species and some cultivars.

Date of description of all species and some cultivars.

Index Hortensis is printed clearly on good quality paper and is bound in stout boards of a size that will slip into most pockets.

Like the *Plant Finder*, taxa listed have been collected from modern sources. All have been available through the trade since 1984. Neither *Index Hortensis* nor the *Plant Finder* attempts to include all plants in cultivation. This volume of *Index Hortensis* contains perennial plants only; Volumes 2 and 3 will include woody plants and indoor plants, whereas the *Plant Finder* includes all these groups in one volume.

At £25 this is not a cheap book but I believe the years of painstaking research that have gone into its preparation have produced an end product of a quality which justifies the price.

Footnote:

Most ferns named since 1959, and hence subject to the most controversial part of the ICNCP, are not in general horticulture. The three name changes suggested here are the exception. It is hoped to include a full update on fern variety names in the proposed BPS centenary publication as part of a list of all cultivars introduced over the last hundred years.

The 1990/91 edition of the *Plant Finder* will probably have been published by the time this part of the *Pteridologist* appears. For the record, however, details of the 1989/90 edition are as follows:

THE PLANT FINDER by Chris Philip and Tony Lord. Pp. 570, 19 maps. 210 x 145mm. Hardy Plant Society. 1989/90. ISBN 0 861 0 325 0 (paper back). Price £8.95 (p & p extra).

Unlike *Index Hortensis* the *Plant Finder* is a guide to which nurseries stock each of the 40000 plants listed.

MARTIN H RICKARD

SHORTER NOTES

Abstracts from the 1989 Fern Gazette

Main articles:

The history of *Diphasiastrum issleri* in Britain and a review of its taxonomic status by A C Jermy.

The existence of two types of clubmoss within the *Diphasiastrum alpinum* group in Britain is confirmed (i.e. *D. alpinum* and *D. issleri*). Due to introgression between taxa and the likely hybrid origin of *D. issleri* it is proposed here that both *D. issleri* and *D. alpinum* are reduced to subspecies of *D. complanatum*.

Compression and slingshot megaspore ejection in *Selaginella selaginoides*, a new phenomenon in pteridophytes by C N Page.

An aberrant form of *Equisetum telmateia* from the west of Ireland by M R I Westwood.

A new species of *Selaginella* from Cameroon, West Africa by N Quansah.

New ferns of Madeira by Mary Gibby and J D Lovis.

This fascinating and well illustrated account describes five endemic taxa from Madeira.

Hymenophyllum maderense - an allopolyploid derived by chromosome duplication from a hybrid of *H. wilsonii* and *H. tunbrigense* - a species which might turn up in Britain.

Asplenium trichomanes subsp. *maderense*.

Ceterach lolegnamense

Polystichum X maderense. A handsome hybrid between *P. falcinellum* and *P. setiferum*, therefore almost certain to be hardy in Britain.

Polystichum falcinellum x ?. A hybrid whose second parent is uncertain.

The ecology and distribution of Pteridophytes of Zomba Mountain, Malawi by A Berrie.

This is a comprehensive fern flora of a mountainous region of central Africa. Since frosts are known from an altitude of 1500 metres up to the summit at 2085 metres there is a chance that some species could be hardy. There is a comment that frost damage to tree-ferns (*Cyathea dregei?*) has been seen. A candidate for testing in Cornwall?

Preliminary report of chromosome counts in the genus *Azolla* by K K Stergianou & K Fowler.

Short Note:

Dryopteris x fraser-jenkinsii - a correction by Mary Gibby and C J Widen.

Book Reviews:

Pteridophyte flora of Oaxaca, Mexico by J T Mickel and J M Beitel.

Azolla utilization, edited by W H Smith and E Cervantes.

MARTIN H RICKARD

Poirot gets it right? - Not so, Agatha!

The other evening I was idly entertained by one of those delightful films of Agatha Christie mysteries starring Peter Ustinov as Hercule Poirot, the Belgian sleuth who, like Cagney & Lacey and all those others, is always there when there's a murder.

In *EVIL UNDER THE SUN* (1982) the scene was set in a rich peoples' escape hotel on a tiny, quiet Greek Island (ironically filmed on Majorca, British *lager louts'* new paradise). Diana Rigg had been strangled on the beach and the culprit, of course, had to be one of the company.

At the end of the film the great man held us all in suspense as he revealed who the killer was. Actually, on this occasion he did it rather clumsily, failing to convince the party until the very last minute when he urgently sought the signature of the one we all knew did it: Patrick Redfearn.

Now you begin to see why I'm writing this for the *Pteridologist*. You see Redfearn accidentally signed himself by his real name: *Felix Ruber* as Poirot knew he would, having worked out that his English pseudonym was simply a translation from the latin of that well-known criminal's real name ahem!

This of course reminds us of Rudolf Hess who, on parachuting into Britain during the last war, announced that his name was Alfred Horn. However, he was right and Agatha Christie was not. But wouldn't the story have been a bit of a flop if the dastardly fiend had called himself Patrick Redcat?

M'lud, I offer as evidence the sacred word of Edmund C. Jaeger in his *Source book of biological names and terms*:

fel. L. *felis*=*feles*, genit, *felis*, a cat, the prolific one, she that bears young *felinus*, belonging to a cat. Ex: Fel-idae (mam.); Fel-ichtys (Pisc.); Feli-opsis (Mam.); Felis (Mam.)

felic-L. *felix*, genit. *felicis*, fruitful, productive. Ex: Felix (Mam.); Felix-astraea (Coel.); Felixi-gyra (Coel.) See also fel.

feline-L. *felineus*, of or belonging to a cat. See fel.

filic-L. *filix*, genit. *filicis*, a fern. Ex: filic-ial; filic-inus; filici-form; Filix.

filix-see filic.

Oh, but they should have asked for Dyce advice first!

They'll be talking about *Dryopteris felix-mas* before long!

JAMES W. MERRYWEATHER

PHOTOGRAPHING FERNS

Part 1. A picture is better than a thousand words.

C N PAGE

Royal Botanic Garden, Edinburgh EH3 5LR

This is the first part of a longer article. Further parts will appear in future issues of the *Pteridologist*.

A personal view

I am an amateur at photography. So this is not one of those articles that says everything technical about photography, but does not, in the end, seem to apply much to the subjects that you are particularly keen to photograph. Such photographic skills and tips that I have accumulated, and want to try to pass on, are ones which have been acquired from using a camera as a means of recording ferns and their habitats, endeavouring always to achieve the best result possible, and to build upon the experience so-gained.

I have been photographing, or attempting to photograph, ferns and fern allies for more than a quarter of a century. Most of my techniques and equipment probably reflect this. Nevertheless, having started as a rank beginner, I have gradually improved and refined these techniques, and in the process have accumulated a library of both slides and black and white negatives covering most of the myriad of ferns which I have found in both temperate and tropical parts of the world. It has been my practice to photograph ferns, in preference to collecting them, unless there was some good reason for pressing a frond. I have always approached ferns in this way, long before conservation was a byword.

When I first began, I found that photographing ferns was not easy. Indeed, 'who said it was' was what I kept saying to myself when, in less than ideal photographic situations, I found myself hanging by one hand from a tree trying to align a camera on to a particularly attractive tropical epiphyte, while mosquitos nibbled at my ankles and leeches dropped on me from the branches above.

Now, so many years later, I still think that ferns are some of the most difficult of subjects for photography. But don't be put off. In my case, the stimulus to succeed was a combination of necessity and blind persistence. Later, the appearance of the book by Rasbach, Rasbach & Wilmanns (*Die Farnpflanzen Zentraleuropas*, Fischer, Stuttgart 1976) showed so well that successful photographs of ferns can be taken and reproduced with great effect and technical accuracy. So it was *possible* to succeed, and Kurt & Helga Rasbach's excellent photographs have consequently remained a stimulus to me. Earlier, however, it was my tutor, Dr. T.G. Walker, who undertook the hard work of initiating me into the mystique of the rites and rituals of photographic film exposure and developing, fern-frond silhouetting, and darkroom printing, and his patient tuition has certainly stood me in good stead as a baseline from which to develop this branch of pteridology ever since.

The sequence of headings used below (and in subsequent parts of this article) begins with the plant and its environment rather than with a long check-list of equipment. What then follows is distinctly a botanist's approach to photography, rather than a photographer's approach to botany!

Where are we heading and what are we after?

A photograph of a fern is to me not just a straightforward image of a plant, although if it is correctly exposed, sharp, and annotated with species, place and date, it is an important enough achievement. But our aim can be more than that. Photographs of ferns can also say much about the form, seasonal phase and sequencing, habit and texture of a plant, as well as its colour, if taken on colour film. Further, if taken in the plant's wild habitat (and most of the ones I have shot are) then a photographer can also show the plant in its wild setting and, possibly, give some indication, be it even only a marginal glimpse, of where that setting is.

Additionally, it may be possible to include in the photograph some indication of the conditions under which the fern was growing, perhaps during a shower of rain or after, perhaps in mist, or fresh with dew. A fern photograph can thus convey not only the form and setting of the plant with which we are dealing, but can also capture something of the atmosphere of the setting and climate of that plant too. Thus approached, such a photograph can technically, I think, say much more than does either a herbarium specimen or perhaps a thousand words.

Taking and choosing your time

My first piece of advice is: be patient and avoid hasty and ill-considered shots. Unlike animals, ferns will not run away. So, with such a captive subject, you can afford to choose your moment with care.

You can also carefully choose your plant or plants. Decide, for any particular species, what you want to show. A single plant? A trio? A group? (Pairs, alone, seldom give a satisfactory result). Or you may wish to show a whole habitat and to supplement this with a more distant view.

Look for plants in a suitable setting - preferably one characteristic for the species at the particular site, as well as ones which are photogenically attractive. No fern will look at its best in a poor setting, and some situations might be more appropriate to colour than black-and-white work (the latter always requiring a background colour which, when converted to shades of grey, will not 'lose' the fern in question).

Quite often, such settings 'choose' themselves. The trick is in seeing them - another reason for not hurrying. I find that there is a special, little-stated, law of pteridology that invariably comes into play here. It states that the most photogenic fern is always to be found ten minutes after you have run out of film. So be prepared for this major part of the enjoyment.

(To be continued. Subsequent sections will cover controlling the environment, composition, exposure, filters, choice of films, equipment, printing and reproduction).

STOP PRESS

I am pleased to announce that the winner of the competition set in *Letter from Hawaii* in the 1989 *Pteridologist* is Bridget Graham. Congratulations! I hope it will be possible to publish the winning suggestion in the 1991 *Pteridologist*.

CHRISTOPHER FRASER-JENKINS

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1991

THE
BRITISH
PTERIDOLOGICAL
SOCIETY

PTERIDOLOGIST

Edited by
M.H. Rickard



CENTENARY

1891 - 1991

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The BRITISH PTERIDOLOGICAL SOCIETY was founded in 1891 and today continues as a focus for fern enthusiasts. It provides a wide range of information about ferns through the medium of its publications and available literature. It also organises formal talks, informal discussions, field meetings, garden visits, plant exchanges, a spore exchange scheme and fern book sales. The Society has a wide membership which includes gardeners, nurserymen and botanists, both amateur and professional. 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*, Society business and meetings reports.

Membership is open to all interested in ferns and fern-allies. **SUBSCRIPTION RATES** (due on 1st January each year) are Full Personal Members £12.50, Personal Members not receiving the *Fern Gazette* £9.50, Student Members £7, Subscribing Institutions £20. Family membership in any category is an additional £2. Applications for membership should be sent to the Assistant Secretary (address above) from whom further details can be obtained. (Remittances made in currencies other than sterling are £3.00 extra to cover bank conversion charges). Airmail postage for all journals - an extra £4.00, or for those not receiving the *Fern Gazette* £2.50.

(Front cover: Centenary logo designed by Nicola Plummer.)

Back numbers of the *Gazette*, *Pteridologist* and *Bulletin* are available for purchase from P.J. Acock, 13 Star Lane, St. Mary Cray, Kent BR5 3LJ, from whom further details can be obtained.

PRESIDENT'S LETTER

BARRY A THOMAS

Welcome to our Centenary Year. I am sure that it will be a good one for all of us, as several years of planning are clearly beginning to produce results. We have an excellent programme of events spanning the year to culminate with our September Centenary Celebration meeting and A.G.M. in the Lake District. Come to it so you can see where it all started one hundred years ago. We will be at the Southport Flower Show as usual, but, in addition, we have a competitive fern show at Pebworth. The organisers of both hope that members will make a special effort to exhibit this year so, if you have never contemplated showing your ferns, try it this year.

For the first time, we will be at the Chelsea Flower Show where we hope to spread our enthusiasm to some of the many thousands who will visit us there. We have our own Stand in the Scientific Section and the R.H.S. will also have a major display of ferns to which many of our members are contributing. Sometime during the year you should also catch sight of one of our travelling exhibitions "One Hundred Years of Ferns" as they tour around the British Isles.

Our two special publications are well underway. "Ferns of the World" with its 180 colour photographs will be available at a very cheap price thanks to the generosity of so many members who loaned their colour slides. It is expected to be very popular and a must for you all. "One Hundred Years of British Pteridology" should also be compulsive reading for those who want to know a little more about our Society and the history of fern study. Both will be available from *B.P.S. Booksales*.

The programme is almost complete for our Symposium on the Propagation and Culture of Pteridophytes and Martin Rickard is taking bookings for the National Tour of Fern Gardens. Both events offer unparalleled opportunities for our fern-growing enthusiasts. Make a special effort this year, come to the meetings and enjoy yourself. This is the only B.P.S. Centenary year that you and I are going to have. Have a good time and join in because you can't wait for the next one!

SHORTER NOTE

My Interest in Ferns

It began so long ago that I do not now remember when it was, or how it became a consciously-felt thing: as distinct from the parental interest in natural history, of which my inheritance was very strong. Perhaps being a Devonian, and in continual contact with a set of plants about which no one seemed to know much, induced a wish to find out more about them. They were to a great extent looked on as freely available for decoration, and yet not much use for this purpose owing to their tiresome habit of fading almost at once. This may have produced a feeling that there was surely more to be said for them, than just this only. But it did not, till long after, lead to any attempt to grow them; and first efforts to do so were complete failures owing to complete ignorance, which lasted till my early twenties. About 1913 understanding and opportunity suddenly came, together; though even so, I do not recall exactly how. But it has (as a combined thing) never failed since: and when, in or about 1923, I had a garden of my own, and still more when about 1925 contact was made with the British Pteridological Society, "fern fever" became chronic and appears to be incurable; which I am more than contented it shall be.

Rev. E A ELLIOT

Editor of *The British Fern Gazette* 1949-1958, Secretary of the Society 1951-58.

MUSINGS ON ANOTHER MAIDENHAIR MYSTERY

JUDITH JONES, 1911 4th Avenue West, Seattle, WA 98119, USA

It seems that I cannot leave the subject of *Adiantum pedatum* and its subspecies alone as concerns articles written for the BPS (Jones, 1986, 1989). I have lots of unanswered questions concerning other species that I grow but this stubborn interest in ferreting out the origins of certain accepted trade names for *pedatum* "forms" has been plaguing me for some years.

It seemed that, with the publication of the proper denomination of *Adiantum pedatum* subsp. *subpumilum* for the dwarf five-finger maidenhair, many illegitimate names would be laid to rest (Wagner and Boydston, 1978). It did deal with the confusion of linking this dwarf form, sometimes referred to as "Aleutian Island Form" or "aleuticum", (based on a rumour of its occurrence there), and set it apart from the recognized subsp. *aleuticum*, which is not imbricate although it may have reduced stature in some ecological niches. Also discounted were epithets such as "minor" and "imbricatum". It is the last named form that has continued to distress me. I definitely felt that what I had seen in English gardens as "imbricatum" was a taller less congested plant than the subsp. *subpumilum* (Fig.1) I had been growing in the Pacific Northwest.

For those of you who do not know the history of the dwarf maidenhair it was introduced into cultivation in the 1950s by a prominent Seattle horticulturist, Dr. Carl English. Rumour had it that Dr. English had discovered the fern growing wild in the Olympic Mountains of Washington State. It was believed there was no support for that rumour and it was reported by Dr. C. Leo Hitchcock, an eminent botanist at the University of Washington in Seattle, that "Dr. English was only repeating what he had heard about it having been found on the Olympic Peninsula; he did not collect it there."

In fact, since the publication of Dr. W.H. Wagner's article in 1978, *subpumilum* has been found along the coast of the Olympic Peninsula. It is considered a coastal fern as the type description is that of a single population found in 1977 on Brooks Peninsula of northwestern Vancouver Island, British Columbia, Canada. It is important to note that Dr. English was a close friend of Ed Lobrunner of Victoria, B.C.; a talented alpine nurseryman well-known for his observant eye and skillful hand at bringing selected variants of choice native plants into cultivation. If, indeed, the first *subpumilum* to parent the 1950s introduced stock did not come from the Olympic Peninsula it might well have come from Vancouver Island.

Ed Alverson, studying at Oregon State University under Dr. David Wagner, has collected specimens of subsp. *subpumilum* and subsp. *aleuticum* from various northwest sites. I saw his collection briefly for the first time this fall as it was being planted at the Rhododendron Species Foundation in Tacoma, Washington. Most of the fronds were in the initial stages of winter demise so further perusal and comparisons will have to wait until spring. I was allowed a few fertile fronds from a *subpumilum* collected at Mystic Cove on Vancouver Island (see Fig.2), and one collected on the Olympic Peninsula. The spore is sown, the cultures are greening rapidly, and only time will tell the full story.

Getting back to my puzzlement with the "imbricatum", keep in mind that the official description of *subpumilum* states that it comes true from spore. As detailed in my 1989 article in the *Pteridologist*, my co-nurseryman and I experienced at least a 1% reversion back along normal lines. It finally struck me just recently that among those reverted plants was a whole population of ones that were reminiscent of those I had seen in England as "imbricatum". They were taller than *subpumilum* proper, but not as tall as the normal species, and exhibited a moderate degree of imbrication or overlapped pinnules (Fig.3). When we sow from this reverted population we get a few throwbacks to *subpumilum*, and a fair mix between those in the intermediate range, with modestly

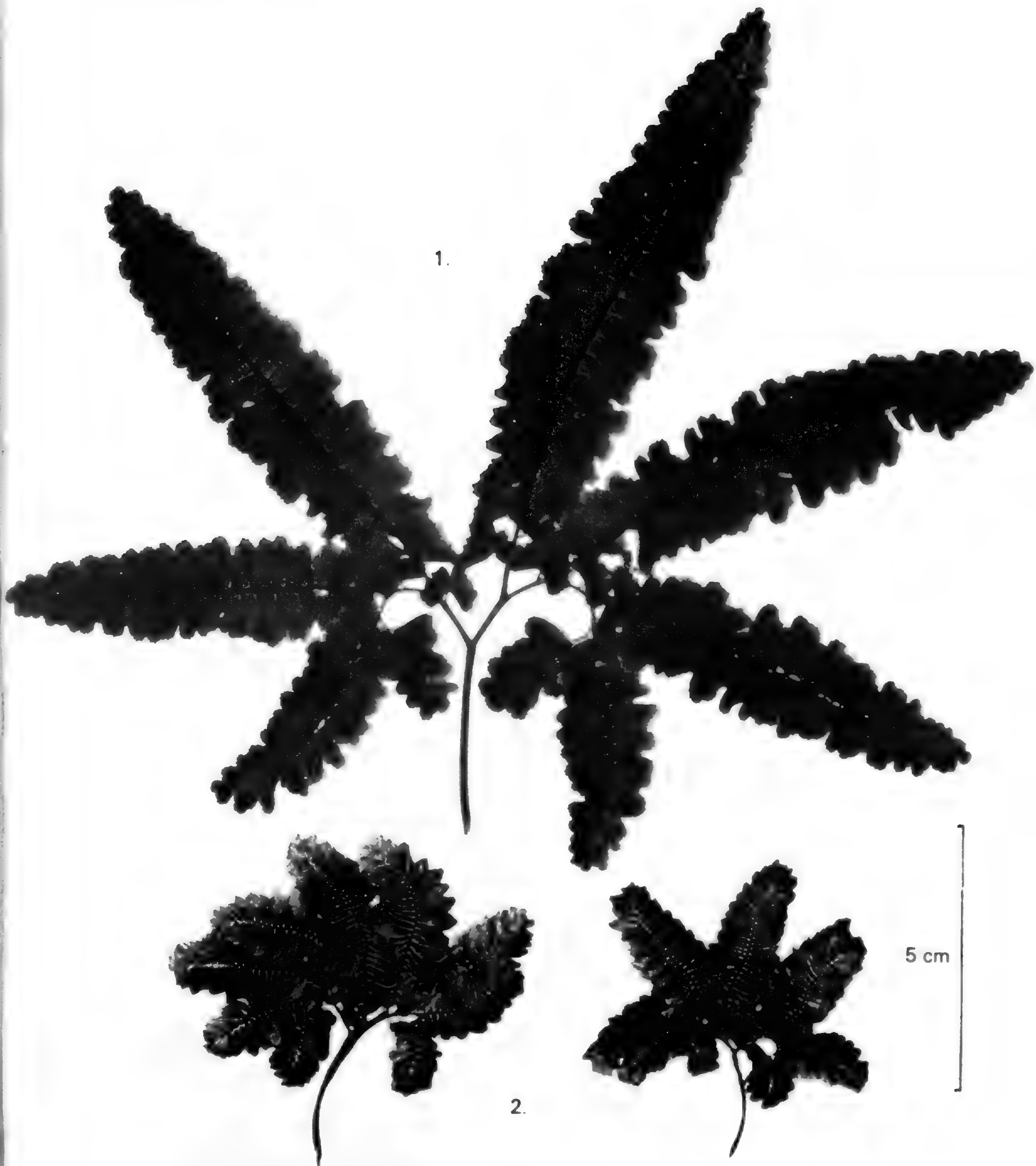


Fig. 1 - *Adiantum pedatum* subsp. *subpumilum* (nursery stock).

Fig. 2 - *Adiantum pedatum* subsp. *subpumilum* from Alverson collection, Mystic Cove, Vancouver Island, British Columbia, Canada (2 fronds).



Fig. 3 - *Adiantum pedatum* sporeling from reverted plants selected from an *Adiantum pedatum* sowing. Very much like English plant material labelled *Adiantum pedatum* 'Imbricatum'.
 Fig. 4 - *Adiantum pedatum* subsp. *pedatum*.

congested pinnules, and those that resemble the more typical *pedatum* subsp. *pedatum* allowing for the usual pinnule variation (Fig.4). It is my surmise that since spore of *subpumilum* has been available for over thirty years it seems likely that the English "imbricatum" arose from a sowing of *subpumilum*. I'd love to hear from anyone who has information or conjectures about this very likely probability.

References:

- JONES, J 1986. *Adiantum pedatum*: Another variation. *Pteridologist* 1, 96
 JONES, J 1989. New fern variation - USA. *Pteridologist*, 1, 280.
 WAGNER, W H Jr & BOYDSTON, K E, 1978. A dwarf coastal variety of Maidenhair fern, *Canadian Journ. of Bot.* 56: 1726-1729.

SHORTER NOTE

Centenary Fern Show - Pebworth - Saturday 13th July

This Show is the first specialist Fern Show organised by the Society for very many years, possibly the first this century. Fortunately, the Southport Flower Show continues to hold fern classes, and will again this year, but for those of us living in the Midlands or the South it is not always the most convenient site. This one-off chance to exhibit at Pebworth on the Worcestershire/Warwickshire borders is, therefore, hopefully going to tempt many more members into competitive showing, as well as appeal to the Southport regulars.

I, for one, have never shown but this year I intend to have a go. Perhaps it is not ideal for the blind to lead the blind, but Hazel Key of Fibrex Nurseries, who is organising the Show for the Society, has passed on a few tips to me. Hazel suggests that if plants are to be lifted from the garden specially, a simple system is to water abundantly two days before the Show, then lift and pot up a day before the Show. Also ensure that pots are clean, and that plants are correctly and neatly labelled. It would be even easier if you select your ferns now and pot up in soilless potting compost and place in a shady spot outside; if you don't forget to water regularly your ferns should be fine for the Show. An occasional general liquid feed would be helpful. Remember a fern does not have to be big to be beautiful and the best!

If for any reason any potential competitor is unable to stage an exhibit on the Friday night or Saturday morning of the Show, Fibrex Nurseries have kindly offered to do it, as long as the ferns are delivered to them in a show-ready state during the seven days before the Show. In this case it would be as well to contact Hazel Key first, either when returning the Show Schedule, or by phone on (0789) 720788. If you have not yet had a Show Schedule write off for one now to Fibrex Nurseries, Honeybourne Road, Pebworth, Stratford-on-Avon, Warwickshire CV37 8XT.

Because Fibrex Nurseries have ample space to accommodate quite a few caravans, any member with a touring caravan or tent can stay on site overnight and make the whole event an enjoyable weekend away.

The Show will be advertised to non-members of the Society and is timed to coincide with an open day in the village of Pebworth and with the visit of the BPS Centenary Tour of British Fern Gardens. It should be terrific fun; do enter if you can and help ensure the success of this project.

I nearly forgot! Another good reason for entering is the chance of more than paying your way. Over £300 in prize money, divided into 60 different prizes, has been put up. There is ample opportunity for every entrant to win something. For further information on any aspect of the Show please contact Hazel Key.

MARTIN RICKARD

VARIATION IN BLECHNUM SPICANT

J W DYCE, 46 Sedley Rise, Loughton, Essex IG10 1LT.

Blechnum spicant, the Hard Fern, is a very common fern throughout most of Britain. The *Atlas of Ferns in the British Isles* shows it to be less than common only in central Ireland and in the English eastern counties. To quote the *Atlas*, it is "a sub-Atlantic species widespread throughout wetter parts of the British Isles. It is restricted by lack of suitable acid sandy substrate in much of lowland agricultural England. Similarly, absent from the limestone areas of both England and Ireland". It is very much a lime-hating fern, but even so can be found on the limestones of the north of England - in hollows in the accumulation of surface detritus from which all the lime has been leached.

This fern, in the species form, is of very simple construction with two kinds of fronds. The sterile ones are evergreen, up to about 12 inches (30cm) or more in length, narrow, lax and outspread; the pinnae are narrow, undivided, dark-green in colour, glossy, hard and tough in texture. The fertile ones are deciduous, upright and rigid, with smaller pinnae which become progressively reduced in size towards the frond base where they become very rounded and widely spaced. The sori are linear.

Although the Hard Fern cannot be regarded as a great variety producer, it has been fairly generous in the past in giving us some good ones. But it has been sadly neglected, undeservedly so, I consider. Even in the normal species form it makes a handsome garden plant with its dark-green glossy foliage and upright rigid fertile fronds. It is overdue for a "come back" and some active spore-sowing by today's fern growers could achieve that end. To our knowledge, relatively few varieties remain in cultivation today. One recent find is a first-rate deeply serrate variety by Martin Rickard. We hope we can keep this variety which, we are pleased to note, can not only reproduce itself, more or less, true from its spores but give us other kinds of variation as well.

I am afraid that this review of variation in the Hard Fern must really be an informed obituary, to some extent, to keep alive in our minds what the fern is capable of in the production of varieties, so that fern hunters will not pass the species by in the wild and dismiss it as of no account without giving plants a close scrutiny.

Past records include some first-class forms. As with other variety-producing species, crested varieties feature largely, some of them quite elaborate, most of them very ordinary. Pinnae overlapping has produced some good imbricate plants, as has crisping of the pinnae. Plants with serrated pinnae, as in Martin Rickard's find, have been recorded more than once, the finest being 'Plumosum Airey'. Ramose varieties have turned up at times in the past - and still do; most of them are very dwarf and most attractive. 'Rotundatum' with the pinnae reduced to rounded lobes is still being found in the wild. The classic example of this is Druery's 'Concinnum', but later finds are equally as good. Plants with very narrow pinnae, 'Lineare', can also be noted in the wild, but they are not exciting finds although interesting. An intriguing variety produces spores on the barren fronds and I shall refer to this further on when discussing *B.s.* (Crispo-minutissimum group) 'Hall'.

In the following list of varieties it will be noted that, while I have used the old Latin naming for varieties found and named prior to 1959, I have (reluctantly) conformed to the ruling of the *International Code of Nomenclature for Cultivated Plants* in the naming of later finds.

My list of varieties is arranged - with some amendments by Rickard - in accordance with my *Classification of Fern Variation in Britain*, published in the *Pteridologist*, Vol.1, part 4, pp.154, 155, 1987. It includes not only varieties which may be obtainable today from nurseries or from private sources, but possible refinds from the wild by the observant hunter. I would add that it is not impossible to find an entirely *new* variety.

Cristatum - is the most common variation likely to be found, ranging from simple forked frond tips to more complex division (Fig. 1a). There are several very good ones in cultivation but the only one listed in commerce under the name is a find by Reginald Kaye in an old garden many years ago. It grows to about 12 inches (30cm) high with the frond apices neatly crested.

Ramosum - plants with fronds branched two or more times from the base of the blade, usually narrow, dwarf or fairly dwarf and heavily crested, have been found a few times in the post-war years. One very good one, found in the Outer Hebrides several years ago, was given to a nurseryman for safe-keeping but I do not know if it is still alive. Also existing is a named plant -

Ramo-cristatum - a dwarf form with the branching fronds neatly crested.

An interesting variety in this Group is a brachiate form which we hear nothing about these days but which seems to have been quite a common find around the beginning of this century, chiefly in Ireland. It is called -

Trinervium - with the two lowest pinnae considerably elongated in typical brachiate manner. Druery tells us in his *British Ferns and their Varieties*, page 137, that it was found in Wicklow by a Dr Kinahan and subsequently, in considerable numbers, in the Mourne Mountains by our member, W H Phillips. Does this variety of the Hard Fern still exist in those areas? If it was so common in the Mourne Mountains area in Phillips' time it would seem safe to assume it can still be found there. Perhaps some of our fern-hunting members, exploring the area, can refind this fern. It would be interesting to have it in cultivation again.

Druery also lists a similar variety, named *Trinervium Hodgsonae*, which he describes as "extremely distinct". It was found on Kirkley Moor but I cannot trace this locality on any of my maps; I assume it is somewhere in the Midlands.

Angustatum - plants with very narrow fronds can at times be found but no *named* ones are, to my knowledge, in cultivation today. Druery, in his above-mentioned book, lists a few, one called -

Linearum - found at Witherslack in Cumbria, with fronds evenly narrow, undivided and almost strap-like.

Unnamed varieties under the Section names *Linearum* and *Rotundatum* are grown by a few of our members. In the *Pteridologist*, Vol.1, part 1, 1984, p.43, an inconstant form is depicted, found by Martin Rickard in Powys, Wales. Unfortunately, the frond depicted here (Fig.1b) is the best one from the same plant; none of the others are so neat, but he hopes for better things from its spores.

A word of explanation is called for here. The names *Angustatum* and *Linearum* mean *narrow*, and the variety mentioned above is indeed a true *linearum* since its narrow fronds are undivided and almost strap-like. But there can be confusion in this species, *Blechnum spicant*, over the names *Linearum* and *Rotundatum* because the *linearum* description can also be applied to the *rotundatum* varieties of the fern with their small rounded pinnae which make the fronds very narrow or linear.

In 1989 I received from our member, C E K Scouller, who lives in the Western Highlands near Ullapool, two *Blechnum* fronds, one fertile the other barren, belonging to the *Rotundatum* section, which, to me, were most exciting (Fig.1e). I wrote to Mr Scouller, asking if he had the plant, but alas! it was about 20 years ago, before he began to keep records, that the sight of the plant had intrigued him and he collected only the two fronds. The fertile one is somewhat irregular but the barren one is nearly perfect - BUT, were the other barren fronds equally perfect? I have suggested to Mr Scouller that he tries to refind the fern - who knows, it *may* be an exception which contradicts my oft-repeated pessimistic statements about the longevity of fern varieties in the wild;

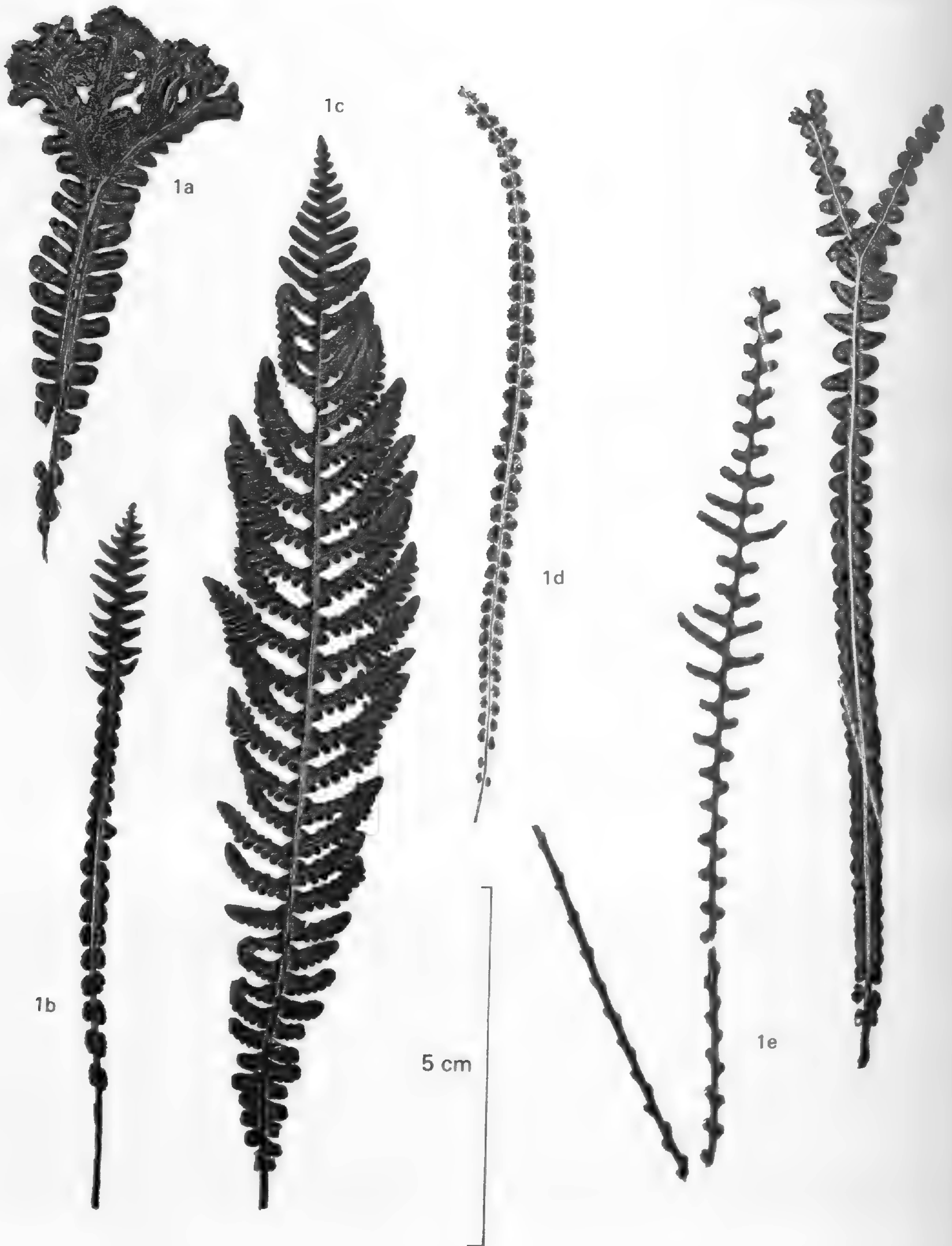


Fig. 1 - Cultivars of *Blechnum spicant*. a) 'Cristatum' form. b) 'Linearum' form from Powys, Wales. c) (Serratum group) 'North Wales'. d) 'Concinnum' - reduced x 2/3. e) (Rotundatum group) 'Sutherland' - fertile and sterile frond.

it may even have reproduced itself in good progeny! It would be an exciting event to re-find this fern.

(NOTE - Fern hunters visiting this part of Scotland, the Loch Naver area, should contact Mr Scouller for details of the locality - his address is in the Membership List published in the 1990 Bulletin, Vol.4, No.1).

A plant which Druery regarded as one of his best finds was in this section. He called it -

Concinnum Druery - with regularly rounded pinnae, sharply and evenly toothed. The barren fronds were less than half-an-inch (1.25cm) wide and 9 inches (23cm) long. In Druery's words, they were "like a string of scallop shells". The fertile fronds were merely beaded stalks.

In spite of Druery's strong regard for this fern which was one of his earliest finds (1881) and helped to fire his enthusiasm for fern variation, I can find no trace of it being depicted anywhere in his voluminous writings. This is most surprising considering that he was no mean artist with his line drawings. There is, however, a very small illustration of it in a plate of line drawings of *B. spicant* varieties in the *British Fern Gazette*, Vol.2, No.14, 1912, p.25.

Druery's find was made on Exmoor in the West Country and, subsequently in 1909, an exactly similar variety was found in the Lake District by W Lancaster. This fern Druery did choose to illustrate in the *British Fern Gazette*, Vol.1, No.8, 1911, p.174. (Fig.1d).

Crispatum - plants with dwarf or semi-dwarf fronds, very congested in growth and with crisped or twisted pinnae and also some turgid brittleness. Druery listed several varieties but none have survived. Several years ago I found, growing on rocks by a waterfall in South Wales, a small colony of Hard Fern varieties, all about 6 inches (15cm) high, with very crisped and overlapping pinnae. I collected one of them, but it never did well and struggled on for some years before dying. I am sure this variation could be found, at the least quite frequently, in areas where the fern abounds, if it is looked for carefully. The only plant of this variety we have today - or *did* have? - is a very dwarf find -

(Crispo-minutissimum group) 'Hall' - found in the post-war era by Nigel Hall on one of the North Wales mountains. It is only 2 inches (5cm) in height, very congested, crisped and fleshy. (See *Pteridologist* Vol.1, Part 1, 1984, p.43). When found it had one tiny fertile frond which was in very poor condition, but it provided a few scrapings which were sown in the hope that some spores still remained. Nothing came up in the spore pot! A few growers possess, or did possess, this small gem but I have heard nothing about it for a long time and I hope it still survives. My plant started behaving strangely several years ago by developing abortive spores on the barren fronds and then died the following winter.

Dentatum - plants with deeply crenate or serrate fronds are far from common, although Druery depicts some in his book *British Ferns and their Varieties*, and there are frequent recordings of very good *serratum* finds and bred varieties in the early volumes of the *British Fern Gazette*, along with photographic plates - some are reproduced here. Plants with minor serrations can be found if searched for but the really good ones are very rare and have the serrations so deep that they become almost or completely bipinnate and plumose, so much so that they have been called *plumosum*. I list a few of them here, not because they still exist - *they don't* - but what has been found once, and more than once, can be found again -

Serratum, Smithies - found in 1913 by J J Smithies on Dartmoor. It was said to be one of the best wild finds but, unfortunately, no photo was published in any of the fern literature.

Serratum, Henwood - found in 1916 by C Henwood as a small plant growing on a wall in Buckinghamshire. It ranked among the best and was very foliose,

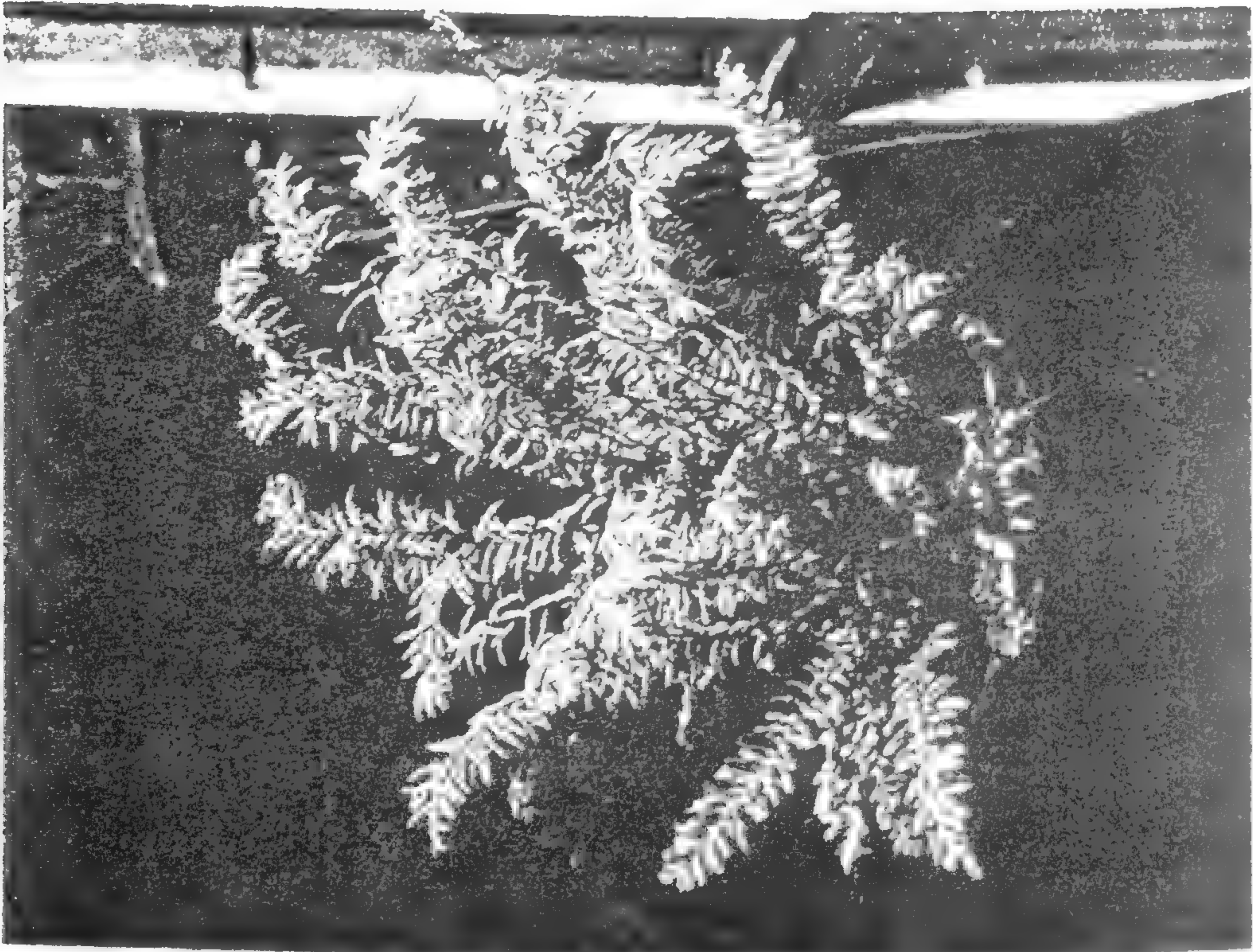


Fig. 2 - *Blechnum spicant* 'Plumosum Forster'

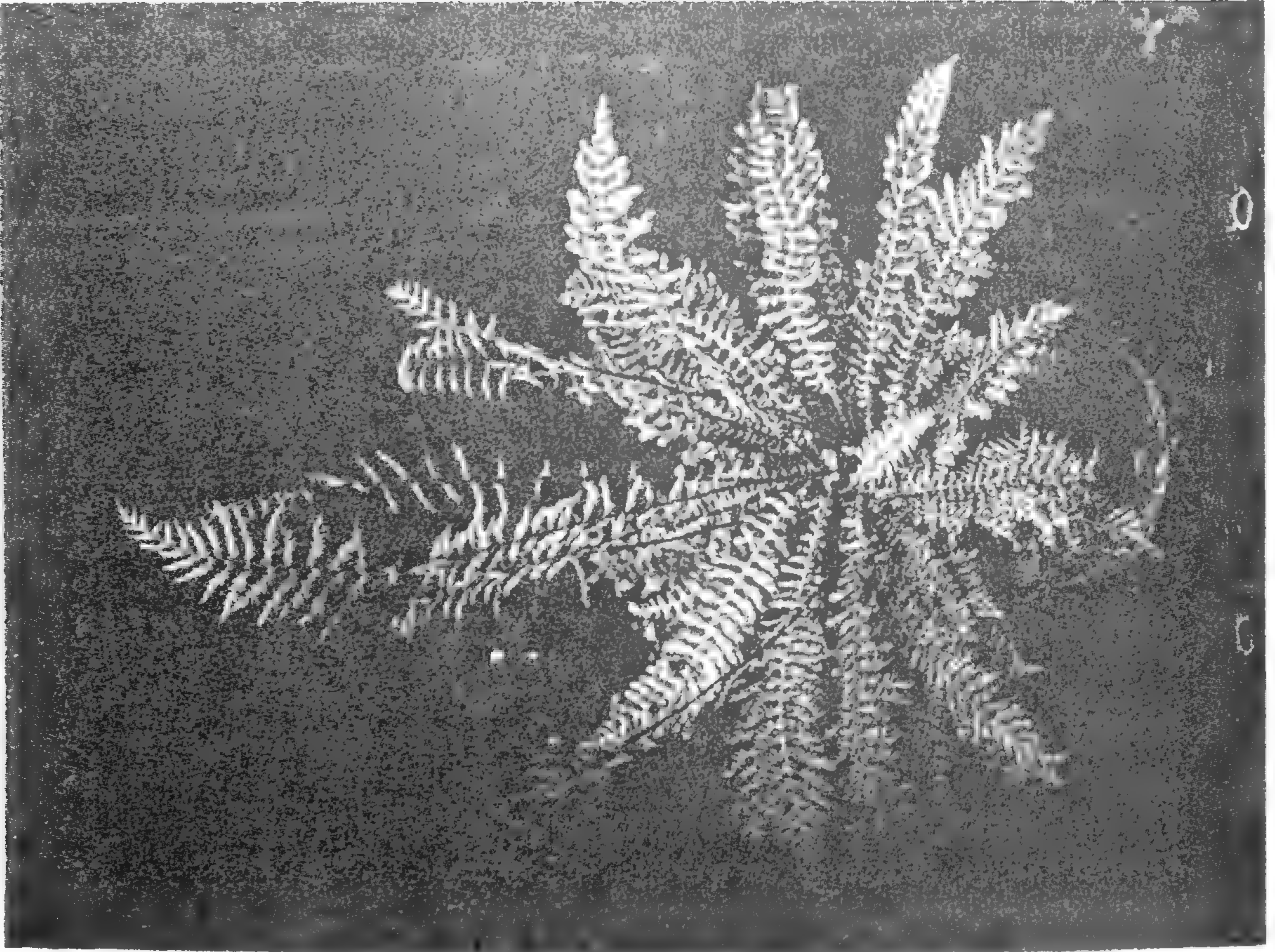


Fig. 3 - *Blechnum spicant* 'Bipinnatum Sheldon'

with broad overlapping and deeply divided pinnae. Again, we have no photographic record, due to economies dictated by the First World War.

Plumosum Forster - bred by W Forster and exhibited by him to the Society in 1924. Its origin is lost. It was foliose and bipinnatifid with slight cruciation which was only partial and occasional. It is depicted here (Fig.2).

Bipinnatum Sheldon - raised sometime between 1916 and 1930 by J J Sheldon from spores of Henwood's *Serratum* listed above. It had the same characters in a more pronounced form, being thoroughly bipinnate. It is depicted here (Fig.3).

We now come to the very finest variety ever produced by this species but, strangely, neither Martin Rickard nor I can find much more detailed information about it than appears in Druery's *British Ferns and their Varieties*, page 134. All the published references to it at the time, in the final decades of the last century and the first few of the present one, in the gardening literature of the time by Druery and in the early volumes of the *British Fern Gazette*, give us no further details. We have a photograph of it, nothing more, and this same photograph (Fig.4) appears in several publications of the time. I rather suspect that the fern had a very short life and the most was made of the only surviving record - this photograph! The variety was -

Plumosum Airey - raised by T Airey. Druery states - "Decidedly the finest form of all; tripinnate and robust". The pinnae were divided into half-inch (1.25cm) pinnules which were themselves deeply divided. The photograph was from Druery's own plant. Airey was an active fern hunter in the Lake District in the 1860/70s and several of his finds have been recorded in *The Ferns of the English Lake Country* by W J Linton, second edition 1878. One of his finds was made at Windermere, described as almost bipinnate with very large secondary segments and we think it must have been from the spores of this plant that he produced his 'Plumosum Airey No. 1', depicted here. An inferior form 'Plumosum Airey No. 2' was also bred but we hear nothing further of this.

It is pleasing to report that, although all those fine varieties of *Blechnum spicant* have been lost, the variety *Serratum* has again been found in the wild in the post-war years. This find is a first-rate plant, ranking equally with the best finds of the past. It is called -

(*Serratum* Group) 'North Wales' - found by Martin Rickard in North Wales in 1973 (Fig.1c). It has fronds up to 9 inches (23cm) long, the barren ones having very regularly and very deeply indented pinnae which have a pronounced upward curve and in well-grown plants can be very much more than just serrate. The fertile fronds have very narrow pinnae which have a backward curve, just like *Revolvans*. In cultivation, my plant developed pinnae segments much enlarged to become almost pinnules.

In 1977 Richard Rush sowed spores from the Rickard find and successfully raised several plants, among them a very good bipinnatifid form, (*Bipinnatifidum* group) 'Rush'. This is depicted in the *Pteridologist*, Vol.1, Part 1, 1984, p.43. It seems obvious that the variety 'North Wales' has great possibilities and can emulate the very best of the past varieties.

A minor form of *Serratum* is *Incisum*, but it could, in my opinion, be a producer of much better things in its progeny. It can be found occasionally in the wild but is not sufficiently attractive to appeal to the majority of variety collectors. But it can present a challenge!

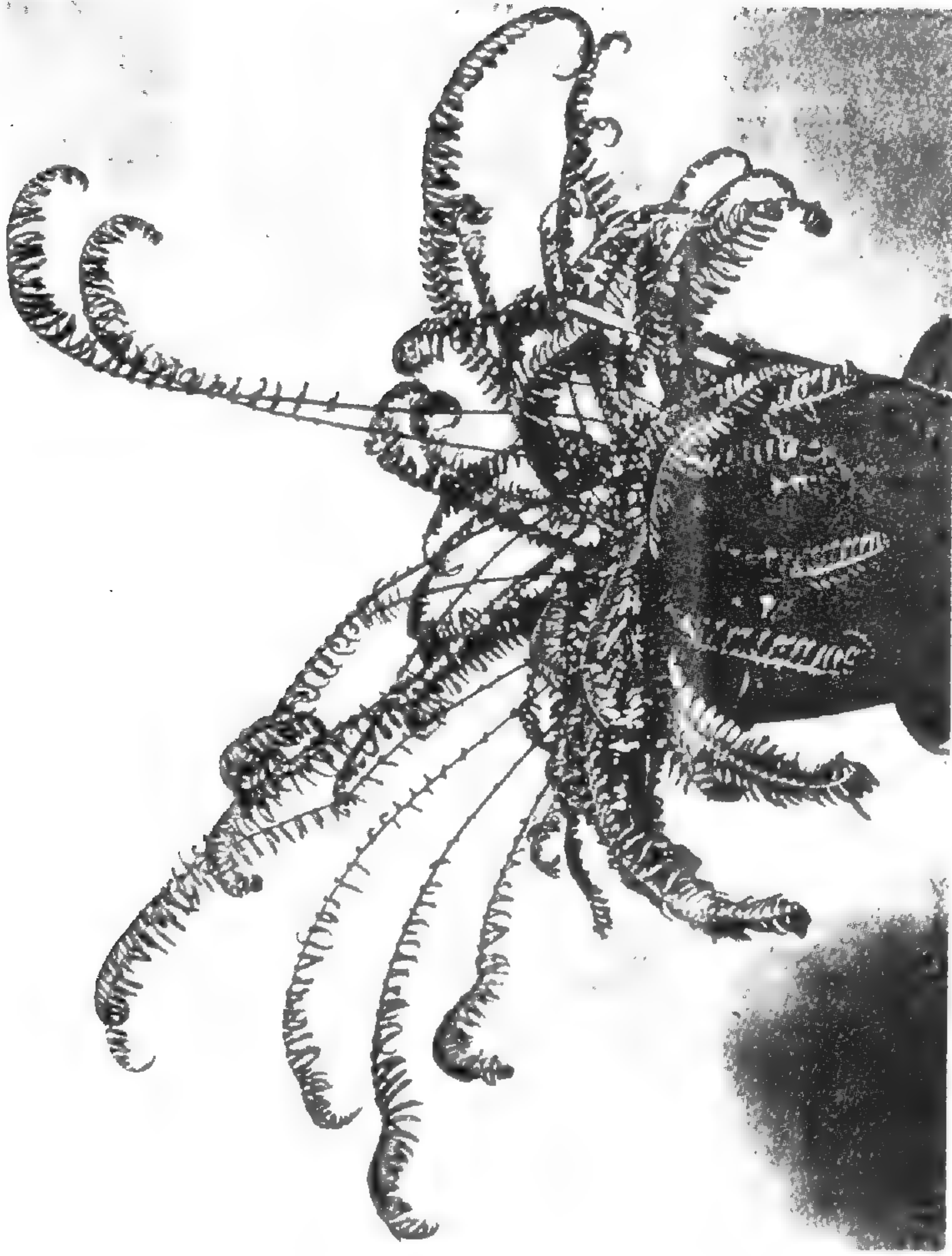


Fig. 5 - *Blechnum spicant* 'Revolvens'

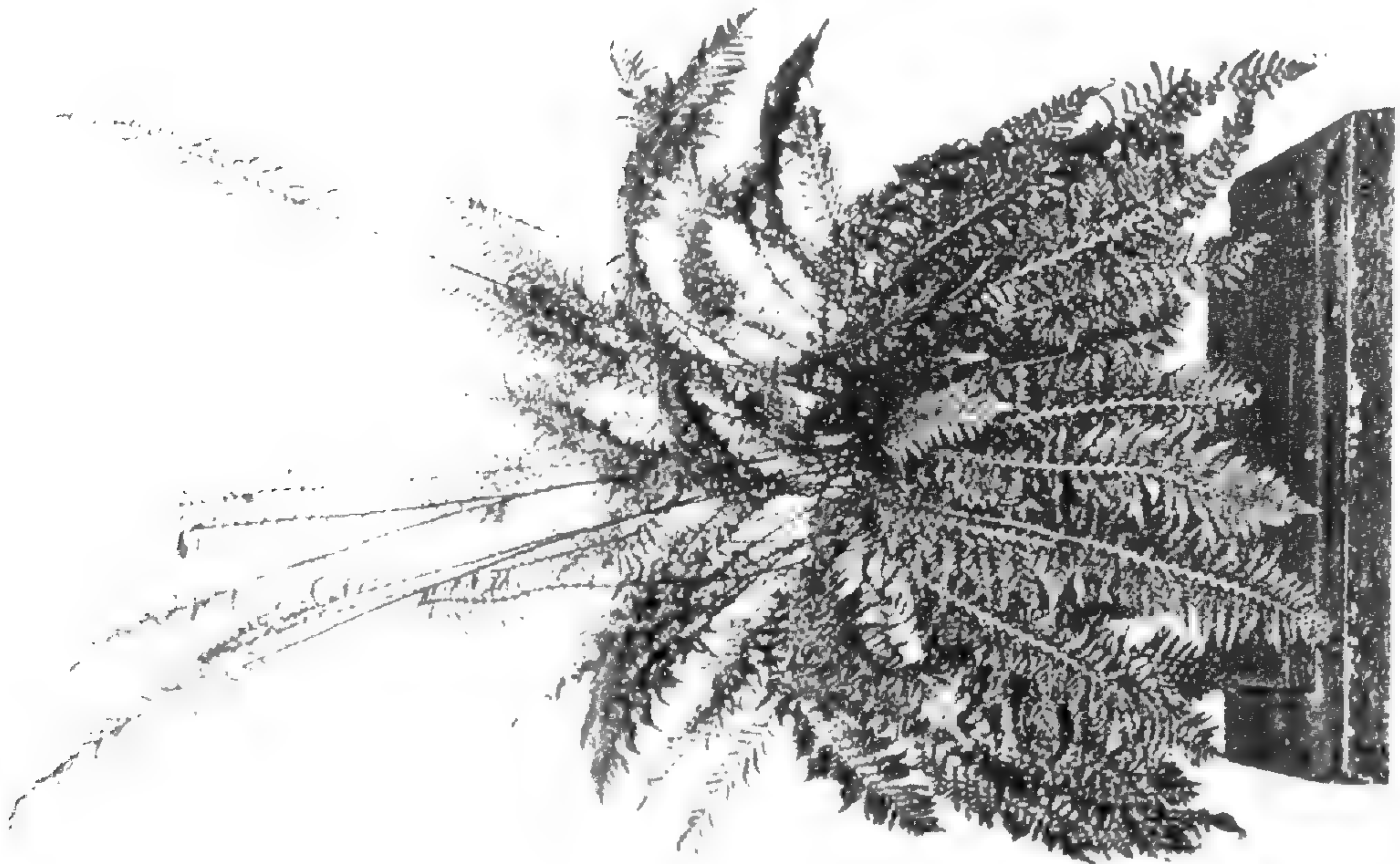


Fig. 4 - *Blechnum spicant* 'Plumosum Airey'

Two types of variation remain to be mentioned. One is - *Revolvens* - by no means a common kind of variation found in this species and, indeed, has only been recorded once and named -

Revolvens - found by C T Druery near Barnstaple in Devon round about 1913/14. It will be seen from the illustration depicted here (Fig. 5) that it was a very good example of its kind with very fully recurved pinnae. It was said to yield quite true progeny with the incurved character as fully marked as in the parent. Like all the others, it has passed on.

My last variety is a very strange and unique plant which was named -

Paradoxum - found by G Whitwell in Bannisdale, Westmorland in 1877. It is difficult to picture this plant and I can best describe it in Dr F W Stanfield's language and leave the reader to build up his/her own picture. "It was an absolutely unique plant, no fern with this three-winged character having been recorded in any species so far as the writer knows. The frond was, at first sight, somewhat of the *strictum* (contracted, narrow) character with toothed and abbreviated pinnae, but along the middle of its upper surface was an upright ridge like the crest on the back of the male newt. The ridge was, however, divided into lobes, corresponding to pinnae, and the frond was consequently described as having 'three rows of pinnae', viz. the two normal lateral rows and, in addition, the vertical pinnate ridge. The upright row had no lower surface but both sides had glossy epithelium similar to that of the upper face of the normal frond...The plant was given to Mr Barnes, a very successful grower of *Blechnums*, to look after...and it became established and developed over twenty fronds of some three inches in length...Unfortunately, ...the plant was divided with a knife, the result being that one of the pieces perished entirely while the other was all but killed...It never became robust...and eventually died without progeny more than thirty years after its discovery."

Dr Stansfield laments its passing as a great disaster to the fern world, more than the loss of many more beautiful plants, even though its decorative value was very small. Unfortunately, no frond, photograph or drawing of the fern exists.

I hope this paper will stir up enough interest in this neglected species to encourage hunting for varieties and to grow and experiment with them in the hope of recovering some of the past losses. I think the great trouble with this fern has been overlooking the fact that lime is a positive poison for it. I admit I have been at fault in this respect by using hard London tap water, but my ground dries out so much in the summer - particularly in the two past summers - that I can never get enough rainwater for watering purposes. To succeed with *Blechnums* a moist, open, loamy and leafy soil, free of lime, is needed. It is somewhat of a bog lover, growing largest in moist shady conditions with water available below for its roots to tap.

SHORTER NOTE

From the Spore Exchange Organiser:

I am hoping to build up a file of information about the ferns usually offered on the spore list and would like to hear from members on two points in particular. I am interested to discover whether there are ferns which people have tried to grow repeatedly from spores without successful germination. Also I would like to hear from members who are growing outside many of the foreign hardy or near hardy species which are now more widely available, particularly which species have survived unscathed in the recent cold weather and those that have succumbed. Correspondence about this or other matters concerning the Spore Exchange should be sent to me at 201 Chesterton Road, Cambridge CB4 1AE.

MARGARET NIMMO-SMITH

EQUISETUM FUNGICIDES?

R.N. TIMM, Castle Villa, Church Lane, Minting, Nr. Horncastle, Lincolnshire LN9 5RR

The traditional use for *Equisetum* in polishing and cleaning is probably familiar to everyone; however, in *Plants a Plenty* by C Osgood Foster, an American book which gives a slightly 'off beat' introduction to the propagation of plants, I found a paragraph on sowing seeds, which seems to refer to a natural fungicide or sterilizing agent -

Keep the workbench and containers clean, too, by using a 1% solution of clorox. Or you might want to try an *Equisetum* solution. This can be prepared by combining 1 cup of *Equisetum* weed - known as horsetail - with 1 cup of water in your blender. Then blend on medium speed for a minute or so. If you have the weed itself, it might help to bury pieces of it in the soil.

Though it seems, from this paragraph, that this is a familiar and perhaps traditional practice in America and, from subsequent lines, that the solution may be commercially available, few other horticultural books appear to have anything to say about this use of *Equisetum*. In a book on folklore, however, I found this one short line -

Mildew - scatter dried mareetail on the ground round plants likely to be affected.

Neither of these give any clue to the origins of this idea, or to which species or species to use. The former does state that it grows in 'sandy places' - could this be *E. arvense*? Scattering dried material on the ground beneath a plant would seem a doubtful way of preventing mildew unless the active component is extremely potent! *Equisetum*, being a genus with a long evolutionary history, however, may have evolved a biocide for its own protection, powerful enough for use in disinfection. Alternatively, could this simply be an idea which has arisen out of confusion over the use of *Equisetum* in scouring? Several other B.P.S. members I asked said that they had no knowledge of the subject, therefore, there could be a great deal of interest, if anyone familiar with the facts could provide more information.

SHORTER NOTE

WHAT'S IN A NAME?

Common names for plants are a fascinating study. They tell us so much about history, folklore, medicine and country practices. Yet they are disappearing fast in this day of 'standardisation'. As new species appear in our flora new 'common' names are coined, sometimes translations of the foreign name, sometimes descriptive, sometimes not. From the earliest British Floras English names were given, e.g. Hudson's *Flora Anglica* (1762) and Withering's *Systematic Arrangement of British Plants* (1776) and most of them most descriptive. The danger with a national list (like *English Names of Wild Flowers* Dony *et al.* 1974, 1986) is that those interesting regional names get lost. The latter also introduced a way of signifying a 'generic' common name by introducing hyphens which play mockery of the English language. I am keen to collect local names for British ferns (and allies) - in English, Welsh, Gaelic, Urse, Doric or any other language or dialect. And if you have interesting stories about old uses for these plants, please let me know about those too.

A.C. JERMY

MY FILMY-FERN HOUSE

CHRISTOPHER J. GOUDEY, R.M.B., 1175 Cozens Road, Lara, Victoria, 3212, Australia

An Introduction to *Leptopteris*

About sixteen years ago, I was shown a plant of a *Leptopteris* sp from Mt. Bartle Frere, North Queensland* in cultivation at Montrose, Victoria (see fig 3, rear). It belonged to David Jones (well-known author).

To me, it was the most beautiful fern I had ever seen. David had a spare plant and it was not long before I managed to relieve him of it and set it up in a large terrarium in my glasshouse. I have still got the same plant to this day, although considerably larger.

I soon learned that there were two more species in New Zealand, *Leptopteris superba* and *L. hymenophylloides*, so in March of 1975, my wife and I set off for a holiday to New Zealand. We returned home with many ferns including the two *Leptopteris* spp. They suffered a severe setback whilst in quarantine, but they survived and in a few years grew to become quite large. It was not long before I had acquired a plant of *L. fraseri* from the Blue Mountains (Fig. 3 opp. p.64), west of Sydney and *L. moorei* from Lord Howe Island (Fig. 1 opp. p.64).

In 1978, we moved from Werribee to a five acre property at Lara near Geelong, Victoria. The *Leptopteris* spp were all transported to Lara in large plastic bags and set-up again in terrariums under a skylight in a large shed. We built several large glasshouses and commenced growing ferns commercially. The *Leptopteris* soon outgrew their terrariums, so I set aside an area in one of the glasshouses for them.

I built a wooden frame approximately 18ft long (5.4m) by 4ft wide (1.2m) and 4ft high (1.2m), with a lift-up lid. I covered the polybox as I called it, inside and out, with clear polythene. I had a raised soil bed in the base, into which I planted the *Leptopteris* spp. They flourished in their new environment and were soon out-growing their polybox.

The Remaining Species

I collected *L. wilkesiana* (Fig. 2 opp. p.64) in Fiji in 1982 and again in 1989 in New Caledonia. My first plant of *L. x intermedia* came from Iolanthe Small from Pukekura Park at New Plymouth, New Zealand, and in 1988, I travelled to Papua New Guinea to seek out the two remaining species, *L. alpina* from Papua New Guinea and *L. laxa* from Bougainville Island. I was very fortunate to obtain the latter as, shortly after, the unrest started at the island's copper mine.

Amongst the other filmy-ferns I grow, my next favourite would have to be *Trichomanes* (*Cardiomanes*) *reniforme*.

Establishing the Filmy-Fern House (Fig. 4 opp. p.65)

For many years, I had been planning the construction of a filmy-fern house. I wrote to the curators of the filmy-fern houses, Royal Botanic Gardens, Kew and the Huntington Botanic Gardens, San Marino, California for any information they could give me.

I commenced building in January, 1988. The house was to be 32ft long (9.6m) by 16ft wide (4.8m) and the walls were constructed of concrete blocks 8 inches thick (20cm). The roof was covered with alternate sheets of corrugated fibreglass and corrugated iron. The iron was used to help cut the light back. The entrance was through an airlock. The ceiling was lined with ultra-violet inhibited polythene, to give a double-glazing effect.

The soil beds are all raised and the run-off is drained into a pit which is pumped out automatically onto the garden outside. Two spinning disc humidifiers were installed,

drawing in only tank water, and two small fans circulate the air in the house. A small quantity of fresh air is drawn through a system of pipes and introduced at floor level, and an exhaust fan draws out the stale air at the other end of the house.

All this sounded good, but I had many problems the first year. The hot summer sun heated the north wall and the inside temperature was getting too high. The humidistat was not functioning accurately. I like to keep the humidity above 80% at all times. Eventually I had to house the humidistat in a cylinder into which a small low voltage fan had been mounted.

The fan keeps a constant flow of air moving across the humidistat to keep it dry. Before I used the fan the moisture in the air was condensing on the humidistat, causing me no end of problems. With the sensing element wet, it would shut the humidifiers down until it dried out. By this time, the humidity in the house was becoming dangerously low. I shaded the north wall in the second summer and this helped to keep the temperature down.

I also had problems with pockets of stale air in the house. Many of the ferns had a grey mould growing on them and some of them were growing deformed. I installed an evaporative cooler this year, which automatically switches on in the morning and off in the evening. I have had no fungal problems since.

The walls are sprayed automatically for three minutes and the soil beds are watered for ten minutes every second day. The watering jets have been inverted so that they spray onto the soil and not the foliage. I have found that if the fronds of *Leptopteris* spp are wet too often they turn black.

Hybridising *Leptopteris* spp

In 1985, I began experimenting with the hybridisation of *Leptopteris* spp. I had already successfully developed a few *Asplenium* hybrids and was anxious to try my hand with *Leptopteris*.

My method is simple and it worked. I sowed the two species together in anticipation that the spores of one species might be fertilised by those of the other species, which worked in most cases. I successfully crossed the following species -

- L. superba* x *hymenophylloides*
- L. superba* x *fraseri* (see Fig. 2 opp.)
- L. superba* x *moorei*
- L. superba* x sp Mt. Bartle Frere, North Queensland*
- L. moorei* x *hymenophylloides*

Dr Patrick Brownsey of the National Museum of New Zealand sent me a copy of his paper on 'A Biosystematic Study of a Wild Population of *Leptopteris* Hybrids in New Zealand', *New Zealand Journal of Botany* 1981, Vol 19, and I was fascinated to learn that *L. x intermedia* (*L. superba* x *hymenophylloides*) produced good viable spore. My plant was large and fertile, so I collected spore and sowed it and to my surprise the end result was many hundreds of *L. x intermedia*.

This year, I am going to collect the spore from some of my earlier hybrids and if any of them produce viable spore I will attempt to cross them back with *L. superba*. Who knows what I may end up with?

* The *Leptopteris* sp. from Mt. Bartle Frere in North Queensland is regarded by botanists as just an isolated population of *L. fraseri*, but I have grown the two species side by side for many years and I feel that they are quite different.



Fig 1



Fig 2



Fig 3

Fig 1 *Leptopteris moorei* Fig 2 *Leptopteris fraseri* x *superba* (left) and *Leptopteris wilkesiana* (right)
 Fig. 3 from the rear, *Leptopteris* sp. from Mt. Bartle Frere, *Leptopteris fraseri* and *Leptopteris wilkesiana*



Fig. 4 The filmy-fern house showing the double-glazed window and outer door. The pipe frame mounted above the roof is used in summer for shade cloth, although it is not being used this year



Asplenium trichomanes (Incisum group) 'Greenfield'

ASPLENIUM TRICHOMANES (INCISUM GROUP) 'GREENFIELD'

MARTIN RICKARD, *The Old Rectory, Leinthall Starkes, Ludlow, Shrops SY8 2HP.*

I am indebted to Reginald Kaye for sending me the photograph of this superb little fern and for allowing me to publish it here (See Photo opp.). This is surely the most attractive cultivar of *Asplenium trichomanes* still in cultivation. Indeed, we have Reginald Kaye to thank for the fact that it is still with us.

It was found by Percy Greenfield in 1960 on the Society's annual excursion. It was growing on a roadside wall among a large colony of normal forms of *Asplenium trichomanes* near the village of Crowcombe in the Quantock Hills in Somerset (Dyce, 1961). As a keen variety hunter, I can easily imagine the thrill Percy Greenfield must have experienced on that September day thirty one years ago. Jimmy Dyce was present and had they been walking in a different order this charming little fern might now be called 'Dyce'!

The fern had two crowns and one was given to Jimmy Dyce. Later, this one died but Greenfield's flourished. However, some years later the two members concerned decided to pass on the surviving crown to Reginald Kaye at Silverdale. They felt strongly that it had a better chance of survival in the Silverdale nursery's natural limestone pavement with its soft north Lancashire climate. Time has proved that this decision was correct. It is, perhaps, relevant to add that 'Incisums' have proved difficult in cultivation. Indeed, many years earlier Reg had already lost a fine 'Incisum' when he split a well grown plant from the Barnes collection into about 20 crowns only to see all the divisions die! As he observed more recently he has no plans to split the Greenfield plant! (Kaye, 1968).

Asplenium trichomanes (Incisum group) 'Greenfield' is an example of the true plumosum form of *Asplenium trichomanes*, the pinnae are deeply and finely cut and the plant is completely sterile, quite unlike the coarser and quite common 'Incisum Moule'. Greenfield's is the most recent of several similar plumose finds:

'Incisum' - in Jersey by Sherard? in British Herbal 1743 (Druery, 1910).

'Claphamii' - found at Smeerset, near Settle in 1859 (Lowe, 1890).

'Incisum' - found in Westmorland by Mr Wollaston in 1870 (Druery, 1910).

'Incisum' - found near Burnley by Mr S Gibson (Lowe, 1890).

'Incisum' - found in Borrowdale by Miss Wright (Lowe, 1890).

'Inciso-crispatum Clementii' - found in a mason's yard in Lancashire, apparently the best find of all. (Druery 1910).

So often choice plumose forms of our smaller British ferns have disappeared from cultivation, but I hope the publication of this photograph will deliver a stimulus for renewed hunting of the treasures that are surely still growing undetected.

References:

DRUERY, C T (1910). *British Ferns and their Varieties*, London.

DYCE, J W (1961). The British Pteridological Society annual excursion 1960, *The British Fern Gazette*, 9,54-56.

KAYE, R (1968). *Hardy Ferns*, London.

LOWE, E J (1890). *British Ferns*, London.

REPLY FROM CORNWALL - WINNER OF THE COMPETITION SET IN 1989 BY C R FRASER-JENKINS in 'LETTER FROM HAWAII'

BRIDGET GRAHAM, Polpey, Par, Cornwall, PL24 2TW

One possible solution occurs to me that would resolve Mr Fraser-Jenkins' problem concerning the distribution of *Dryopteris aemula* and its surprising occurrence in Hawaii. It is based partly on information and partly on speculation.

Although the author does not believe in "random and especially world-wide spore dispersal for any but, perhaps, a handful of tropical adventives", it could be the answer in this case, depending on what you mean by "random".

One of the earliest records of migrating birds is that of *Colymbus pedviridus*, the Green-footed Poker Bird, which existed some time in the Cretaceous Period, possibly before the North American continent began to split apart from Europe. Remains of this ancient bird have been found in China, Patagonia and on several Pacific islands, including Hawaii. One or two bones of the bird have recently been identified in Central America, but the incontrovertible evidence of its characteristic beak, discovered on several of the Isles of Scilly, proves that the Poker Bird was there in great numbers, where it is also significant that *Dryopteris aemula* is still plentiful.

Whether *Colymbus pedviridus* was forced to make long migratory flights by reason of the ever widening gap between the continents, the subsequent rising of the levels of the oceans and the submerging of the range we now know as the Mid-Atlantic Ridge, must remain a matter for conjecture. But the flight path of the bird would appear to have followed the equatorial counter current, turning east at Panama and then joining the course of the Gulf Stream as it crossed the Atlantic. There is little doubt that the bird would have rested on islands which have since disappeared under water.

The bird was a wader with a highly developed sense of smell. The name derives not only from the green webbed feet but also from the peculiar bill. This was used for stabbing the foreshore in search of food and later, forced by a rising tide-mark, for poking in the humus of woodland and scrub, not only to extract food but also to bury it. This changing habit forced a bird of the foreshore to adapt to an inshore environment. It became fully adapted to prodding for food in the undergrowth. The olfactory organ, located at the base of the bill, enabled the bird to return and collect the meal at a later date. This was a very necessary skill to develop in view of the great energy required to make its long flights, especially as the bird was not fully evolved to its maximum potential. There is ample proof, from the analysis of its fossilised stomach contents, that the Hay Scented Fern was most attractive to the Poker Bird. Possibly it was attracted by the smell, or the scales, or by the spores which had an irresistible flavour. Moreover, the scent of hay would have made it easier to detect underground. The fern could also have been used to line the nests which, it is thought, were large and untidy, built at ground-level within sight of the sea. In any event one can be sure that spores of *D. aemula* would have adhered to the bill, feet and even feathers of the bird and could thus have been transported across the waters, even to our own shores. The bird's summer home was discovered to be on Lyonesse, the lost land between the Isles of Scilly and Cornwall. By all accounts this was a paradise on earth with a gentle climate that was an ideal habitat for vegetation of all kinds. Botanical investigation has shown that the dominant pteridophyte was *D. aemula*, beating Bracken at its own game. A mere 10,000 years ago, as the result of tectonic action between Atlantis and Eldorado, the land of Lyonesse was drowned by enormous tides, and the fertile fields of waving fronds were flooded and swept away.

Now we come to the most crucial evidence. Over the last decade, divers retrieved fossils

of ferns between the layers of slate, for which Cornwall is famous. Furthermore, there are impressions of fronds embedded in strata of serpentine rock. These have been reliably identified as *D.aemula*.

I have little doubt that were Mr Fraser-Jenkins to see the collection of fossil sporangia preserved in the Museum of Relics of Lyonesse which is on St Marys, the curator would be delighted for him to examine them under a microscope. He would then see that they are indeed exindusiate as are those in Hawaii.

Minor differences between the varieties of the fern may be accounted for by geographical, climatic and ethnicarian influences (as Darwin proved).

Plus ça change, plus c'est la même chose.

(Don't take this too seriously! Ed.)

BOOK REVIEW

FARNE IN NATUR UND GARTEN EIN NACHSCHLAGEWERK DER ARTEN by Helmuth Schmick, pp.324, about 114 full page line drawings and numerous other smaller figures, 22 x 31 cm. Text in German. Privately published by the author, 1990. Available from the author at: Im Grund 6, D-2056 Glinde, Germany. Price 99 DM including postage.

It is particularly pleasing to see this substantial book published in a country where books on fern growing have been few. The author has been a member of our Society for many years and contributed to the *Bulletin* in 1981.

In general format the book is reminiscent of *The Gardener's Fern Book* by F G Foster. Each species is allocated a double page spread, with an illustration opposite copious notes including a description, details of garden merit and wild distribution.

The illustrations are the key to the book, all drawn by the author in a most attractive style. For the most part they are of a very high quality and should readily enable the recognition of even the more difficult species eg. in *Dryopteris*. I only noticed one exception, *Woodsia pulchella*, which would be difficult to recognise from an uncharacteristically sketchy illustration. An unusual inclusion is a series of sketches of the cross sections of the stipe of many species showing interesting differences between genera. Unfortunately, perhaps because this is a book for the gardener, there are no drawings of the sorus structure of each species.

Only species and hybrids are covered by this book, cultivars are excluded. There are nevertheless many interesting taxa included. I was particularly impressed by *Dryopteris formosana* - one of several species to add to my wants list. Of great value to the gardener in colder regions will be the tables giving details of hardiness in central Germany as well as situation and pH preferences in the garden.

I do not think the nomenclature used here is likely to prove controversial, the only questionable names to catch my eye were *Phyllitis scolopendrium* instead of *Asplenium scolopendrium*, *Ceterach officinarum* instead of *Asplenium ceterach* and *Dryopteris x tavelli* instead of *Dryopteris x complexa*.

Even with my rudimentary German it has been possible to extract tips on how to grow these ferns; however, for patient English speaking members the author has expressed the hope that an edition in English will be produced in the future.

MARTIN RICKARD

PTERIDOLOGY IN FRANCE PAST AND PRESENT: A BRIEF SURVEY

ANDRE J LABATUT, Puypezac Rosette, F-24100, Bergerac, France.

MICHEL BOUDRIE, Les Charmettes C, 21 bis Rue Cotepet, F-63000, Clermont Ferrand, France

From a geographical point of view, France occupies a choice location in Europe. The large size of the country and the variety of landscape allow for a multitude of climatic influences. The most important of these climatic factors which bear on fern growth and distribution are:

- the Atlantic on the Western seaboard.
- the Mediterranean on the Southern seaboard.
- the five major mountain ranges, namely, the Alps, the Jura, the Pyrenées, the Vosges, and the Massif Central.

The easternmost ranges exert a central European climatic influence which results in the occurrence of a boreal pterido-flora. Lying in the Mediterranean sea, Corsica proves to be a major element of the French flora.

As a consequence of such varied environmental conditions, the presence of a large number of fern species in France has been recorded, indeed, one of the largest for a European country. Up to now (1990), 121 native species and subspecies have been listed, four of which (*Asplenium jahandiezii* (Fig. 1), *Dryopteris ardechensis* - discovered by C.R. Fraser-Jenkins in 1981 *Isoetes boryana* and *Isoetes velata* subsp. *tenuissima*) are endemic. Three further species (*Cyrtomium fortunei*, *Matteuccia struthiopteris*, *Selaginella kraussiana*), are considered naturalized or established, whereas the indigenous status of *Pteris vittata* in SE France is still at issue. To this list must be added 49 hybrids.

It has to be admitted that pteridological study in France during the 19th century was not so active as in other countries; it lagged behind research carried out in the U.K. and Germany, for example. However, as there was a general increase of interest in Botany everywhere, a large number of French local floras and catalogues were published by keen botanists. These publications are invaluable today but ferns in general were unfortunately poorly studied and, as a result, references remain too frequently doubtful. Yet, that period saw the publication in 1893 of the earliest of the very few books solely devoted to French ferns: *Les Fougères de France* by C.de Rey-Pailhade.

At the turn of the century, H.J. Coste (1858-1924), while compiling his remarkable *Flore de France* which is still very much in use today, provided the basis for pteridological systematics.

Although no major comprehensive treatise on French pteridophytes was published in the first half of this century, a large amount of regional notes on specific subjects and on field discoveries was produced as a growing number of botanists became more interested in ferns, among them: A.J. Bange, J.Callé, G. Denizot, R. de Litardière - who is credited with the description of *Asplenium x costei* (Fig.2), *A. x pagesii*, *A. x souchei* - L. Poirion, L.de Vergnes, E.Walter. It is not unlikely that these botanists were impressed by the beautiful colour drawings of ferns in G. Bonnier's *Flore Complète Illustrée en Couleurs, de France, Suisse et Belgique*, published in 1934. In 1939, in addition to several regional notes, R. Dhien published a *Répartition Géographique des Fougères Françaises*, but his locality references, unfortunately, are not all reliable. In 1954 M.L. Tardieu-Blot produced the second publication entirely devoted to French ferns, *Ptéridophytes (Fougères et Plantes Alliées)*. Despite these works, French ferns up to the fifties used to be relegated either to the very beginning or end of French floras, under outlandish, obsolete names, as if they were mysterious and incomprehensible

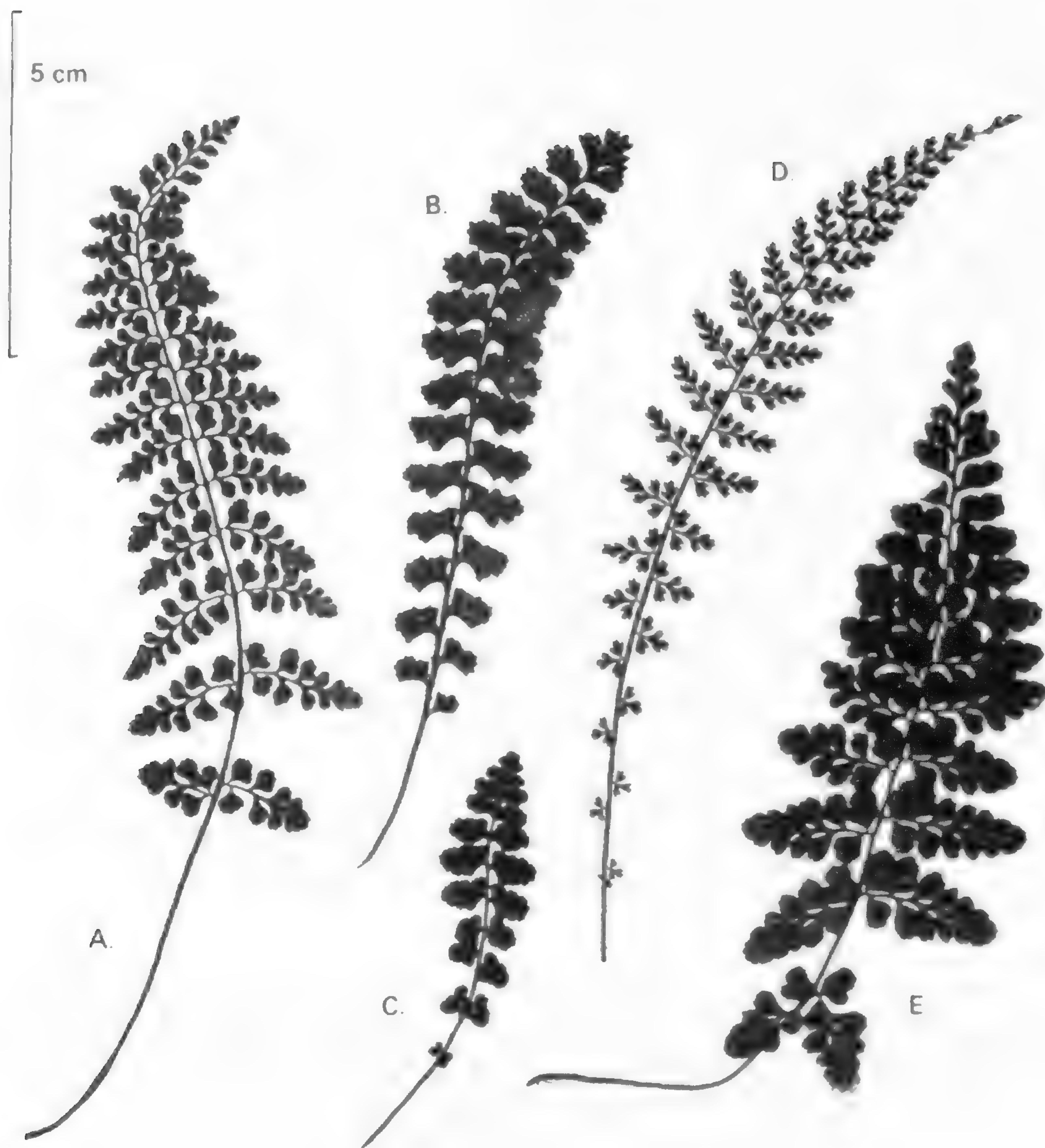


Fig. 1 - The five *Asplenium* species originally described from France and not native to Britain
 A. *Asplenium foreziense* Le Grand, Indre, France, leg. M Boudrie, Jan 1988
 B. *A. jahandiezii* (Litard.) Rouy, Gorges du Verdon, Alpes-de-Haute-Provence, France, leg M Boudrie, July 1985.
 C. *A. petrarchae* (Guérin) DC., Pyrénées-Orientales, France, leg M.Boudrie, April 1990
 D. *A. fontanum* (L.) Bernh., Alpes-de-Haute-Provence, France, leg. A Labatut, Sept. 1981
 E. *A. obovatum* Viv. subsp. *obovatum* var. *obovatum*, Finistere, France, leg A Labatut, July 1982

plants.

And then in the 1960s a new light began to dawn on French pteridology. J. Vivant, an excellent field botanist, developed a special awareness for ferns; within a very few years, he was credited with the discovery, in his area (SW France) as well as in Corsica, of several very interesting new species, such as *Stegnogramma pozoi*, *Cystopteris diaphana*, *Dryopteris submontana*. Most of his finds were published in the two famed French botanical journals, *Bulletin de la Société Botanique de France*, and *Le Monde des Plantes*. E. Contré, too, became more attentive to the various pteridophytes he encountered on his field trips in Central and Western France; in 1972 he correctly identified the hybrid *A. adiantum-nigrum* x *A. septentrionale* in central France, which was later named after him, *A. x contrei*. At the same time, A. Berton made a close study of Horsetails.

The mid-seventies saw the arrival on the French pteridological scene of two botanists. F. Badré and R. Deschâtres, both fern specialists. F. Badré, in charge of the Pteridophyte Herbarium at the Muséum National d'Histoire Naturelle in Paris, set up an extensive work programme with a view to publishing a flora of French ferns. He received great help in his task from D. Deschâtres, one of the leading French field botanists with a sound knowledge of Corsican flora and to whom we are indebted for a number of new species for France and Corsica, i.e. *Cheilanthes hispanica* and more recently *Asplenium balearicum* (Fig.2). F. Badré was warmly encouraged by Professor T. Reichstein of Basel who, incidentally, had introduced him to the fern world. Their combined efforts led to the publication in 1979 of an excellent updated synthesis on French pteridophytes, *Les Pteridophytes de la France, liste commentée des espèces*. This annotated list of all pteridophyte species, subspecies and hybrids then known in Continental France and Corsica, provides cytological and ecological data as well as general distribution for each and every taxon entered. For twelve years now this work has been the major basis for all pteridophyte research in France. No further publication on French ferns can afford to ignore this synthesis. It must also be mentioned that F. Badré, due to his thorough knowledge of fern hybrids, described in 1981 two interesting *Asplenium* hybrids, new to science: *A. x sleepiae* (Fig.2) and *A. x bouharmontii*. He also produced in collaboration with R. Deschâtres and A. Faber Tryon, an exhaustive paper on French *Cheilanthes* in 1982.

All this groundwork, patiently built-up, heralded a new era for French pteridology. It inspired widespread exploration in the field and soon a host of new discoveries were recorded. A number of papers were published in various journals. These discoveries were made by various botanists whose interest in ferns had been rekindled, among them: G. Aymonin, C. Bernard, and P. Berthet - who has found the true diploid *A. cuneifolium* and the hybrid *A. x centovallense* in eastern Massif Central, as well as a hybrid new to Science, *A. x dutartrei* (*A. ceterach* subsp. *ceterach* x *A. sagittatum*). To these must be added, G. Dutartre, E. Grenier, A. Charpin - and of course, R. Deschâtres and J. Vivant already mentioned. At Toulouse University, in his top-level research work, B. Lugardon has recently given his results on the study of the ultrastructure of the perispore of pteridophytes in terms of phylogenetic aspects, in *Spores of the Pteridophyta* just published in Germany in collaboration with A.F. Tryon.

Concurrently, a number of famous foreign pteridologists, H.W. Bennert, C.R. Fraser-Jenkins, H. & K. Rasbach, Prof. T. Reichstein, J. Schneller, who explored France and Corsica, published their discoveries in different foreign bulletins; for example, *Asplenium x cyrnosardoum* and *Cheilanthes x insularis* were described from Corsica while *A. x ruscionense* was described from Southern France. *Woodwardia radicans* was found in Northern Corsica by a German botanist, G. Shulze, in 1963.



Fig. 2 - Some other *Asplenium* taxa from France.

A. *Asplenium balearicum* Shivas, Désert des Agriates (shore zone), Haute-Corse. April 1990, leg. R. Prelli.

B. *Asplenium x costei* Litard. (*A. foreziense* x *A. septentrionale*), Col de Madale, Hérault. May 1989, leg. M. Boudrie.

C. *Asplenium x sleepiae* Badré & Boudrie (*A. billotii* x *A. foreziense*) Andabre, Hérault. May 1988, leg. M. Boudrie.

However, the French botanist whose name occurs more and more frequently at the bottom of current pteridological publications is that of our good friend, Rémy Prelli. Introduced into the fern world by F. Badré, his passion for pteridophytes caused him to produce in 1985 a long awaited *Guide des Fougères et Plantes Alliées*.

This manual (reviewed in the *Pteridologist* 1, 3, 1986) soon proved to be indispensable for all botanists with an eye for ferns. Its main merit is a short description of all known French species accompanied by an illustration or line drawing. These line drawings pinpoint diagnostic characters which separate plants otherwise morphologically alike. It must be stressed that this handbook is the third publication solely devoted to French ferns - if one considers that Badré and Deschâtres' annotated list is more intended for the specialists.

The first edition of this guide soon ran out of print and a second enlarged, revised edition has been recently published (Sept. 1990). The descriptions and determination keys for genera, species, and subspecies have been greatly improved allowing for the possible occurrence of hybrids. Photographs have been replaced by diagnostic line drawings and photo-silhouettes. New species recently discovered have been added. Nomenclature has been up-dated. Reflecting the author's improved knowledge of French ferns, the book gives detailed discriminating characters and more precise data on ecology and distribution.

This addition to the study of French flora proves beyond doubt that if pteridology in France had a rather belated start, today's French botanists are intent on making up for lost time. Fern research and studies of all kinds thrive. Major results are published in *Le Monde des Plantes*, and in the excellent annual publication of the *Société Botanique du Centre Ouest*. This very active society is considered by many to be the leader in the French botanical field today.

Another proof of this renewal of interest in French pteridology was the successful one-day symposium on French pteridophytes (systematic, chorological, biological, and ecological aspects), held at Paris University on November 9th 1990. It was organised by M. Boudrie and S. Muller under the auspices of the *Société Botanique de France*, whose *Bulletin* will publish the different papers presented.

Recently a collation of distributional data has been undertaken under the guidance of R. Prelli for the whole of France, with the kind help of French and foreign botanists. Preliminary results have led to the discovery of a large number of new localities of rare and very rare taxons, and to the re-discovery of ancient localities believed to have disappeared, resulting in a burst of enthusiasm among all fern fans! The outcome of all this will be the publication of an *Atlas Ecologique des Ptéridophytes de France*.

And so as the foregoing amply shows, French pteridology is gathering momentum. It is undoubtedly heading for promising days, as there is no denying that France's secluded woods, streambanks and mountain screes still keep in store precious ferny finds for inquisitive pteridologists.

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For further pteridological references, please consult the first three references given above.

PHOTOGRAPHING FERNS

Part 1 (cont.). A picture is better than a thousand words

C N PAGE, Royal Botanic Garden, Edinburgh EH3 5LR

The hunter and the hunted

No fern or fern-ally ever grows where it does to suit the whims of a photographer. Indeed, it often seems that they grow where they do - in dark places, under cliff overhangs, on the roof of a cave, or half-way up a tree, especially to avoid undue media attention (I'm sure many of us know the feeling). Finding a reclusive species can be an exercise in itself which has long been an important part of pteridological tradition. But don't get carried away in the excitement.

Survival (of both the photographer and the plant) is the most important point here. I once slipped and took an unplanned tumble down 15 feet of rough cliff, cracking my camera against a boulder on the descent and landing on it at the bottom - needless to say, the camera was in better shape afterwards than I was, and turned out to be rather better insured. Thereafter, I decided on a new principle: It is always better to return with no photographs, than not to return at all.

So if a plant is really inaccessible, look for another one. And if you really have to risk life and limb, do try to make a regular point of not trampling most of the other vegetation to death in the process of reaching the plant with your camera or, worse still, taking it with you as you fall.

Telephoto lenses with a macro-zoom capacity can be especially useful in situations of difficult access, but more about these later.

Controlling (!) the environment

Having found your quarry, tried about 25 different poses and finally, probably returned to the first one, the next thing to do is think. Light and wind are usually the two next considerations. The former is usually easier to control than the latter.

The chief problem with light, it seems to me, is that there is usually either too much or too little of it. My best advice is to wait for a day when the light is good and bright but lightly overcast by high cirrus clouds, and thus diffused. Light thus coming from all directions is excellent for ferns, right down to quite misty conditions and exposures of half a minute or more, and it would be difficult to stress too much the importance of getting this right. Using a tripod and, providing that there is no wind (a soft, bright, early morning is often best), you can stop down well (to increase depth of field), and compensate for this with a slow shutter speed. I usually stop-down as far as possible, and then make my exposure as long as practical. If using colour film, photographs taken under such conditions also have the advantage of better colour saturation, which I prefer and which can be particularly useful if the result is to be reproduced.

If you cannot wait for better natural conditions (and some people can't), then I recommend diffusing hard light with a very technical piece of equipment called a ladies' umbrella ('ladies' because they come in a range of pale colours [the umbrellas, not the ladies], while gents ones, for reasons I've never thoroughly understood, seem to come only in exciting shades of black). But this also will work only when there is no wind. If light is mostly from the wrong direction, then reflectors, carefully positioned, can be additionally useful.

Bright, undiffused light can sometimes be effective though. But to use it well, I recommend breaking all the rules and shooting three-quarters into it, as I find that a wholly backlit fern frond, set against a dark ground, can show details such as sori beneath a frond particularly well, although exposures here can be tricky. Bracketing the exposure helps,

and filters can also be valuable. Filters will, of course, themselves further modify the exposure (usually with a loss of 1 or 2 stops), but I will deal with them later.

I usually prefer to use natural light, however modified, for fern photography, rather than to use a flash gun as a light source in the field. For the use of flash raises problems of differential exposure of nearer and more distant parts of the same specimen, as well as tending to flatten the form of a fern even in a successfully exposed photograph (especially if the flash gun is mounted on the camera). My main use of flash has been as a fill-in light source in whole-tree conifer photography - but that is a subject which has an order of magnitude of difference from photographing ferns.

Wind, as you will gather, is the fern photographer's particular delight. Even the gentlest of breezes makes the tips of many fronds quiver in most undisciplined fashion, and if you wait long enough, it can have much the same effect on the photographer too. Wind is less easy to control than light. If the day is even moderately windy (ie. above about wind force 0.001), it is usually better to come back on another day. If the wind is already gentle, but needs that extra bit of stilling to dampen it a little further, I usually fall back on my umbrella again (which is why it looks so tatty).

The personal touch

At this stage, some people have uncontrollable urges to 'garden' their subjects (ie. tidy them up a bit, as if preparing a display of cauliflowers for the county show). Others say that this is cheating, and that the debris surrounding the plant is all part of the natural scene and should be left. Personally, I steer a course of moderation here, usually preferring to remove the odd decaying bicycle wheel and cola can from the picture (the latter usually to be found in the most remote corners of tropical forests) and anything else that looks offensive or intrusive.

Amongst the latter, I number especially grasses (I hope there are no grass-lovers reading this). Grass blades are wearisome things. They turn-up everywhere. They turn annoyingly pale out-of-season, last forever, and usually cut diagonally across the frame you have carefully lined up (which the eye will then follow). They can become especially conspicuous in black and white work, when they appear nearly white against darker backgrounds. I carry a special pair of anti-grass scissors for trimming them away (never pull them, as half the landscape will usually follow). By comparison, fallen leaves do not usually matter (providing you can see the plant for them), for they are usually part of the scene.

At this stage I usually add a scale of some sort into the picture - a reflex action probably resulting from my scientific training. I personally dislike seeing endless shots of lens caps or coins (all of which vary in size anyway). I am, however, happy with a well-placed hand lens, a pencil or penknife (more standard sizes). Some people think it is sacrilege to use any scale at all, but scientifically, it provides a valuable comparison, particularly for unexpectedly small or large subjects. And when you are finished, try not to forget, as I do, to pick it up again. For, to me, this has not become a reflex reaction, and in many places, from Britain to the tropics, there are ferns growing with hand lenses carefully posed beside them still.

Travelling solo

Some things are best done in teams (though I've personally yet to find one). Photography, however, I find is a very personal business. Every photograph takes time - time in setting up or dismantling your tripod, adding or taking-off filters, setting up reflectors and umbrella, choosing the perfect angle, setting focus and exposure, and waiting for that moment when a passing breeze momentarily stops. Then, of course, there is the repeat performance because, at that perfect moment when you pressed the shutter, you realise that you had forgotten to wind on after the last shot, and so the whole process begins again.

So allow yourself plenty of time. Have patience (quite a lot of it). Don't try to hurry. And finally, if you have a good friend to go walking and exploring with, my advice is to go alone, for unless your friend is also very patient, you will one day look round and find that he or she has also taken to working solo instead.

(To be continued. Subsequent sections will cover composition, exposure, filters, choice of films, equipment, printing and reproduction).

CAVING WITH A FEMININE TOUCH

RAY WOODS, NCC, The Gwalia, Ithon Road, Llandrindod Wells, Powys, LD1 6AA

Worming your way down mud filled crevices between razor-sharp limestone blocks is not my idea of fun. To the caver it is one of the most promising ways of discovering new caves. Unfortunately, often after weeks of digging, the bedding planes may narrow and most "digs" end in disappointment. It's often difficult to decide out of many possible sites which is the most likely to "go" or lead into a substantial cave passage. A strong draught, typically into rock crevices on the upper hill slopes in the summer and out in the winter is recognised as a good sign of a cave below.

At a time when photographs from the edge of the solar system are commonplace and the whole of the electromagnetic spectrum can be used to probe into the structure of things, it comes as a bit of a shock to discover there does not seem to be any sort of a gadget practically capable of detecting cave systems. Could there be any biological indicators of hidden cave passage, I was asked by the cavers?

Having watched for over a decade the almost entirely futile scrabbling, digging and dynamiting that had gone on in the search for new caves across Ogof Ffynnon Ddu National Nature Reserve and the adjacent areas of limestone at the head of the Swansea Valley in Brecknock, I hadn't the heart to say no. The whole area is so full of depressions and sinks there just has to be more cave there. To add insult, a huge hole suddenly opened up outside one of the caving club cottages recently. Ten yards to one side and it would have swallowed the cottage.

So I found myself having to present a paper to assembled cavers on a "brainstorming day" designed to come up with new ideas for locating caves. I appeared on the programme, I think, between the impulse radar man and the dowzers. Cabaret was provided by the satellite image man. Like on a TV talent show the audience picked the most promising act and the Lady Fern won an overwhelming vote.

She was, I suppose, my only hope. Pursuing hibernating moths, counting stomata on rock cress leaves and the search for obscure frost sensitive liverworts clearly had not impressed. But the possibility that heaven in the shape of a monstrous cave system might lie behind an apparently feminine fern-fringed crevice had to be investigated.

Out with the cavers back on the hill it certainly began to look quite exciting. Ferns were very limited in their distribution. Sink holes associated with known caves were rich in ferns. As the air sank into them on a mild summer's day moisture condensed in the bedding planes and kept the adjacent soil damp - an ideal situation for prothalli.

Lady Fern seems to be fairly frost sensitive. In the 2nd week of June recent frost damage was evident on many fronds. Did warm air venting out of the caves in the winter assist the growth of sporelings? Buckler Fern seemed to replace Lady Fern on the gritstone cliffs nearby. Moving away from known cave systems a search of holes with and without Lady Ferns certainly made the cavers rethink their views on potential sites for digs and some new draughting holes were found. Perhaps the first cave discovered by the Lady Fern test might be called Ogof Athyrium.

FERN HUNTING

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About the middle of the 19th century the Victorians discovered ferns and the beautiful variations produced by some of our British species, particularly the Soft Shield Fern (*Polystichum setiferum*) and the Lady Fern (*Athyrium filix-femina*), which could be found in the wild by the diligent hunter. Thus began the "Victorian Fern Craze" which lasted into the opening years of the present century when it began to decline, and the First World War effectively finished it off. In its heyday it became a mania and enthusiasts combed the ferny parts of the country for variations, all of which, no matter how minor, nondescript or ragged, were eagerly collected and named. Most of them were fitted only for the rubbish heap, and in the course of time that is where they probably finished up, but among the finds in lanes, woods and on mountain sides were some with regular and beautifully divided fronds, and our garden varieties today are the descendants of those plants. Some are divisions from the actual original finds which still exist, in many cases over 100 years old.

For some reason, which we cannot satisfactorily explain, the best fern varieties seemed to be concentrated in only a very few areas in the country. Some people try to account for this by saying that these regions were more intensively hunted, but I do not think this is the reason, for during the height of the *Craze* hunters were eagerly exploring, throughout the whole land, every nook and cranny where ferns were to be found growing, and although some of the best of the well-known varieties originated outside the epicentres, they were very few compared with the numbers collected in the two main centres, the West Country and the Lake District. A possible explanation is the abundance of the variety-producing species in these areas - for instance, the West Country is the chief centre of the Soft Shield Fern in Britain, and most of the good varieties of this species originate there, while the same applies to the Lady Fern, to a large extent, in the Lake District. Both areas had many resident collectors whose names became prominent in the fern world, and their memories are perpetuated in the names of several of our best garden plants. Best-known of the on-the-spot West Country fern men were Dr E F Fox, Col A M Jones, J Moly and Dr J S Wills, with E J Lowe not far away in Monmouthshire. Others further afield who made this centre their happy hunting ground were C T Druery, Dr F W Stansfield and G B Wollaston. Moly is credited with over 600 varietal finds but, in common with so many of the ferns collected in those days, the large majority of them must have been very ordinary, and many more so very alike that it would take a lot of imagination to tell them apart. In the North, R Whiteside, G Whitwell, J Wiper and members of the Bolton family (now famed as specialist growers or sweetpeas, and still possessing the Bolton fern collection) were a few of the most active, hunting the deep valleys and high hills of the Lake District. And it was those northern fern men who formed themselves into a society, the *Northern British Pteridological Society*. A year later the name was shortened to *British Pteridological Society*, of which I was the Secretary for about 20 years, and later President, following in the footsteps of my illustrious predecessors, C T Druery and Dr F W Stansfield, our two foremost authorities on the variations of the British ferns.

For a period of about 50 years fern varieties became some of the most important garden plants and the demand for them was reflected in the growth of the many specialist nurseries scattered throughout the country. The foremost were Stansfield of Todmorden and Sale in the north of England, Birkenhead of Sale and May of London. Their catalogues, assuming book proportions, remain treasured possessions in the hands of some fern men today, and contain the most remarkable and comprehensive lists of ferns, fully illustrated by excellent line drawings. Some of the plants were priced at several pounds, a very large sum in those days. Other well-known nurseries were Askew of Borrowdale

in the Lake District, Perry of Enfield in Middlesex, Sim of Foots Cray in Kent and Taylor of Bracknell in Berkshire. Alas! they have all gone and now we are left with only one really comprehensive fern variety specialist nursery in the whole country, that of Reginald Kaye of Silverdale in Lancashire. It is pleasing to add that, with the revival of interest in fern growing, other nurseries are again specialising in ferns, chiefly Fibrex Nurseries of Pebworth in Worcestershire and Mrs J K Marston of Nafferton in East Yorkshire. There is even one in America, Fancy Fronds, in Seattle, Washington State, founded by Judith I Jones, an enthusiastic grower of our British fern varieties.

The craze for collecting ferns in Victorian times led to the disappearance from the wild in many parts of the country of many of our rarer and uncommon species. Even normal species plants were collected and sold in the markets and from street barrows in our large towns by the "spivs" of the day who invaded ferny areas and dug up every fern they found. The beautiful Royal Fern (*Osmunda regalis*), in particular, suffered greatly and has now disappeared completely, or become very rare, in many of its old haunts where at one time it was common. The Killarney Fern (*Trichomanes speciosum*) is another example which, because of publicity giving exact locations of its habitats, has vanished from practically all of them. Today, there are only about five or six known colonies of this very beautiful fern in our country, and those of us who know where they are keep silent or mention localities only in the very vaguest of terms. Of course, the more common species in their favourable habitats are as indestructible as the weeds in our gardens, and their removal by the fern-vendors only left room for others to grow and replace them. This is particularly applicable to the Soft Shield Fern in its chief centre in the West Country where it is cut back ruthlessly in the lanes by the hedge-cutters every year and dug up to clear the ditches, but this has in no way reduced the abundance of the species in that part of the country. In other areas the Lady Fern is equally abundant and resistant to the onslaughts made on it to keep it in its place, and this also applies to most of the larger-growing members of the *Dryopteris* genus in certain areas. The dominant ground cover in many Forestry Commission fully-grown and more open forest is composed of vigorous Lady Ferns and various Male Ferns, and when the trees are eventually cut down and dragged from the sites the fern population is virtually destroyed, but such is the resilience of these plants that in a year or two, with tree competition removed, they are more profuse on the ground than before.

However, this does not mean that we can go into the ferny districts and dig up the plants with impunity. Nowadays we are conservation-minded, and laws against the removal of plants from the countryside are strict and well enforced, and are likely to become more so in the future. While the removal of the odd *common* fern cannot upset the survival chances of the species, there are many ferns in Britain which are far from common and the removal of even one plant from a colony of such ferns can have a detrimental effect on the strength of the colony to survive. *I cannot stress this strongly enough.* Besides, very few of our rare species are decorative garden plants, and the fact that they have a struggle to continue living in the wild demonstrates convincingly that only the very skilled and knowledgeable plantsman is likely to have any success with them in cultivation. Leave such plants well alone - you will be most unlikely to keep them alive and are only helping to hasten the day when they will become extinct. If you really think you can succeed with some of our rarest and most difficult ferns, grow them from spores. Provided the plants in a wild colony are flourishing and healthy with full complements of fertile fronds, the removal of one tiny pinnule containing ripe spores will do no harm and will be more than enough to provide you and all your fern friends with as many plants as you can find room for. BUT, it is forbidden to collect even this small part of our *rarest* ferns, and I have to insist that this ruling must be respected.

When it comes to fern *varieties* the situation is very different. Varieties are *not* species,

they are what botanists call "monstrosities", although not in the same rather contemptible way that you and I would use the word! Very rarely, where a certain variety is found in the wild, will there be more than one plant, and for this reason there are conservationists, rather muddled in their thinking, who insist that such plants should not be touched but left where they are. Variant forms are mutations and as such, speaking generally, are weaker in constitution than normal forms and less likely to survive in competition with them. Also, as genetic mutants, they may not only have changed their form but also their sensitivity to their surroundings. In favourable circumstances in the wild they may survive - and even flourish - for a time, but inevitably in the end, by one means or another, they will be destroyed. I can instance many examples known to me of the fate of good varieties which were not collected - a wall or hedge has been removed, a site has been churned up by tractors or animals, a rock face has been blasted, a fire has swept the area or a quarry has been filled in, - and a beautiful fern variety has been lost for ever. Even if such catastrophes pass them by, they will eventually, in the end, be choked out by the more vigorous growth of their own kind or by other plants. Being *unique* forms they have no brethren near by - or anywhere else - to support them and ensure their survival. It is noticeable that the spores of wild *varieties*, even when fully viable, rarely seem to achieve any success in the wild. The *rare species*, on the other hand, is unlikely to exist as *just one* individual in the habitat, and their spores *do* germinate and grow on in suitable places to keep the species going. If one plant is lost there are others to continue the fight for survival, unless the habitat is changing to the detriment of that species, a circumstance to which, I think, insufficient consideration is given, in which case its eventual disappearance is a foregone conclusion.

There is only one way to conserve fern varieties - get them out of the wild as quickly as possible and into the protective conditions of the garden where they can grow and flourish, freed from the strains of competitive struggle. There they can be propagated, both by spores and by vegetative division, to become not just one vulnerable plant in precarious conditions, but a large number spread around in many gardens with a secure future. This is how the fern treasures in our gardens have been obtained and although it may be unnecessary to go out into the countryside for our ferns nowadays since there are enough in cultivation to supply all our propagation needs, nevertheless the occasional excellent variety may be found by the diligent searcher - and it could be a new *unique* variety - and it should be conserved in the only way which *can* conserve it - get it into a garden quickly.

I shall conclude with the names of a few of our best-known *unique* fern varieties, still existing, which originated in the wild as single plants and have never been found a second time. *Athyrium filix-femina* 'Clarissima Jones' was found in 1868 in North Devon, *A.f.f.* 'Frizelliae' in 1857 in Co. Wicklow, *A.f.f.* 'Victoriae' in 1861 in Stirlingshire, *Gymnocarpium dryopteris* 'Plumosum' about 1910 in the Lake District, *Polystichum setiferum* 'Plumosum Bevis' in 1876 in Dorset and *Osmunda regalis* 'Cristata' was purchased by a London nursery from a street vendor as a dormant crown sometime in the 1860s/70s. (It was later spotted growing in the nursery by G B Wollaston who made an offer of £25 for it but was refused!). Not only these plants themselves but their progeny have contributed greatly to the enrichment of our gardens. They were unique finds, and it is possible that other equally unique fern varieties still exist in the wild awaiting discovery, hidden away from seeing eyes in some quiet secluded corners. For this reason alone, conscientious variety hunting in the ferny parts of the country can still be fully justified.

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SHORTER NOTE

Collectors Corner - Nature Printed Plates of a different kind

I am sure that there are many of us whose interests in ferns spread ever widely away from the plants themselves. This can lead to a passion for collecting 'ferny' bits and pieces with almost as much enthusiasm as was given to the botany or horticulture that attracted us to ferns in the first place.

The Victorian craze for ferns gives great scope for collectors for it was clearly reflected in the range of china, glass and cutlery that was decorated with their and our favourite plants. Most of the ferns portrayed on china were either transfers or individual paintings, but at least one firm sold 'nature printed' plates. H. Adams and Company of Longton in 1870 used living fern fronds to impress the moulds from which the plates were made. The ferns are therefore elevated with their veins and sori clearly visible in relief, making the species themselves very easily identified. There were at least eight different plates and they were made in cream or pale blue china with the ferns over-painted in very bright colours. They are the most striking and indeed attractive pieces of 'ferny' Victoriana I have ever seen. Beware, for if you see them you will almost certainly want to buy them.

BARRY A THOMAS

BOOK REVIEW

FLORA OF THE EAST RIDING OF YORKSHIRE by Eva Crackles. Pp. xii, 271, 465 maps, 4 overlays. 1990. Hull University/Humberside County Council. Price £30.00

We are in the age of recording and there is a great desire now to see what changes the havocs of man are reeking on our countryside and flora. Some surveys are short, and give quick guides to the state of the local flora. Others are more substantial, often stimulated initially by the BSBI Maps Distribution Scheme, and painstakingly pursued over many years. The book under review is one such project, culminating in forty years of intensive study by the senior botanist for many years of the East Riding, Eva Crackles.

The *Flora* follows the familiar pattern of local floras with the earlier part of 59 pages being an introduction to the area - its soils, geology, habitats, former botanists (a part I always find fascinating) and conservation. In the account of the flora detailed locations are given with dates and observer or reference. This book has been well edited for the press but I am glad to see Eva Crackles acute field observations being quoted in full. She often has gems to offer about the niche and behaviour of plants that others do not see. Furthermore she is just as keen on ferns as the flowering plants.

The author has thrown out a number of challenges to re-find extinct species. I doubt the reason for the disappearance of *Lycopodiella inundata*, for instance, is climate; or has *Dryopteris cristata* or *Phegopteris* really disappeared altogether? *D. affinis* is only given as the aggregate which is excusable, but it is not excusable to map *Polypodium vulgare* only in the wide sense. The problem with a project that has indeed been a life's work is that the time scale becomes blurred. For Eva Crackles the confirmation of *Pilularia* at Skipwith Common in 1964 is recent enough but that is over 25 years ago. The plant was known to be there in 1987, and I am sure still is, but this *Flora* of 1990 does not tell me that. There is, therefore, much work yet to be done in the East Riding as far as ferns are concerned, and the BPS could help. For those that collect county Floras, this is certainly a nice one to have.

A.C. JERMY



Plates manufactured by H. Adams & Co.



Figure 1 - Hartstongue frond



Figure 2 - Male fern frond

SHORTER NOTE

Fern corbels in church

Corbels, roof bosses, and pillar capitals in mediaeval churches were commonly carved with representations of foliage. Fruit and flowers were sometimes included. A combination of oak leaves and acorns, for instance, is often to be seen. Though the kind of plant depicted is generally recognisable, it is often despite the most detailed carving, either not certainly identifiable or apparently fictitious. Yet among the wealth of foliage decorating churches everywhere fern fronds are exceedingly rare. I never remember to have seen them except in the church which is the subject of this note. And these, I am sorry to say, were not mediaeval.

St Michael's Church at Farway, in east Devon, though Norman is origin, was altered in the 14th, 15th, 17th and 19th centuries. During the Victorian restoration in the 1870s by Sir Edmund Prideaux two stone corbels were added at the base of an arch on either side of the north aisle. The corbel on the north side of the arch shows a frond of a Harts-tongue Fern (Figure 1), and that on the south side comes closest to representing a frond of *Dryopteris filix-mas* or the *D. affinis* aggregate (Figure 2).

In view of the distinctive features of fern fronds it is surprising that mediaeval sculptors were so averse to depicting them, especially as ferns must then have been a far more abundant feature of the natural vegetation than they are today.

T D V SWINSCOW

SHORTER NOTE

Cards and Posters

In our Centenary Year there will inevitably be a lot of material produced to promote ferns. Most new books published get reviewed in this Journal but cards and posters tend to be overlooked.

Two or three years ago the Society started selling fern greeting cards, postcards and notelets. These are reprints of some of the famous Henry Bradbury Nature Prints and feature *Polystichum lonchitis*, *Athyrium flexile*, *Thelypteris palustris* and *Polypodium australe* 'Cambricum'; all are of the greatest scientific accuracy. These have been well advertised on inclusions in our recent journals.

This year the National Museum of Wales has produced a set of eight notelets, four featuring ferns and four featuring fungi, all painted by Dale Evans. Although paintings, as opposed to the above nature prints, these too are good representations of the species depicted; *Phegopteris connectilis*, *Pteridium aquilinum*, *Athyrium filix-femina* and *Cystopteris fragilis*.

I am only aware of one fern poster, prepared by Dale Evans for the National Museum of Wales. It is entitled *Woodland Ferns* and carries paintings of complete plants of 14 different species, including the four extracted for use on the above notelets. Small detail of a further 5 species has been added, along with distribution maps for Europe. Aesthetically, it is a very pleasing item and, technically, it is clear. There are some omissions, eg. *Dryopteris aemula* and *Dryopteris carthusiana*; nevertheless, this poster will double as both attractive and informative. It is available from the National Museum of Wales, Cathays Park, Cardiff or through BPS Booksales at £2.60 each, including post and packing.

MARTIN RICKARD

THE HARDY FERN FOUNDATION BREAKS GROUND

SUE OLSEN, President of The Hardy Fern Foundation, 2003 128th Ave., S.E. Bellevue, WA 98005, USA

As the British Pteridological Society approaches its centenary celebration a fledgling fern organization is emerging in the United States. At the suggestion of the New York Botanical Garden's Curator of Ferns, Dr. John Mickel, a group of Pacific Northwest horticulturalists has incorporated the non-profit Hardy Fern Foundation in the State of Washington. Their goal is to establish a comprehensive collection of the world's hardy ferns for display, testing, evaluation, public education and introduction to the gardening and horticultural communities. Ferns from nurseries and private sources as well as spore-grown rare specimens will be tested in selected environments for their different degrees of hardiness and ornamental garden value.

The Foundation's board of directors has arranged to have the primary research garden at, and in conjunction with, the Rhododendron Species Foundation Garden at the Weyerhaeuser Corporate Headquarters in Federal Way, Washington. This 25 acres facility is divided into scientifically arranged study gardens shaded by a canopy of native conifers - a most inviting setting for an understory of ferns. In addition there is a pond area for moisture loving species and a rock garden to accommodate Cheilanthes and those of the ferns with a xeric preference. The climate is rather similar to Britain's and it is expected that upwards of 1,000 different temperate ferns should adapt to this environment.

The planting is to be laid out systematically, with deference to habitat requirements, so as to show the scientific relationships and differences amongst the species and genera. Hybrids will be planted so far as possible with one parent on either side and varieties will be grouped to show the genetic diversity of a given species. To date two initial work parties in the spring and fall of 1990 planted 333 ferns representing 101 different species, varieties and hybrids. Almost all of this material was donated by local growers and foundation members.

In addition to the reference garden at the Rhododendron Species Foundation, the Hardy Fern Foundation has installed a display garden at Lakewold, the Tacoma estate and public garden of Mrs. Corydon Wagner. It is the intention of this planting to demonstrate how a diversity of ferns can be used in the landscape. 42 species and varieties were set in a sylvan entryway garden and supplement an extensive fern collection already established on the property. A small handout identifies the ferns which are divided into a native and exotic section respectively.

Future plans call for expanded testing and displays at satellite garden locations. To date (Nov. 1990) the Board has received applications from seven potential sites ranging from the climatically severe (Michigan) to the benign (Florida). While the south can hardly be used to test cold tolerance, observations can certainly be made on the effects and rigors of heat. It has also been suggested that a warm climate be included in our research to investigate which of the deciduous ferns can survive without a period of dormancy. The potential for accumulation of scientific and horticultural data is as varied as the localities. Periodic newsletters will keep the membership informed of both the objective and subjective observations on the plantings. Our belief is that it is one thing to know that a plant will survive under snow at 15 degrees F, and quite another to know what it looks like after the storm.

The Foundation's initial membership drive of spring 1990 brought an encouraging and positive response. Membership represents 32 states plus Canada. Furthermore, inquiries and offers of assistance have been received from as far away as Great Britain, Holland and the former East Germany.

In addition to progress reports members will have access to spore through a co-operative arrangement with the American Fern Society's spore exchange and, as material becomes available will have an opportunity to buy plants as well. .

There are test gardens throughout the world devoted to roses, annuals, bulbs etc. The Hardy Fern Foundation's living collections should provide an equal exposure for the promotion of ferns. The Organization has received a grant from the Northwest Horticultural Society and has the support of the American Fern Society, but is primarily dependent upon donations and memberships for its funds. Membership classifications range from U.S.\$20 for an active individual membership to \$1,000 for patrons. Student memberships are available at \$10. Memberships and inquiries should be sent to the Hardy Fern Foundation, P.O. Box 60034, Richmond Beach, Washington 98160-0034 U.S.A AND look for some of our members at the BPS festivities in 1991. We look forward to meeting you all there.

FERN MANIA

J W DYCE, 46 Sedley Rise, Loughton, Essex IG10 1LT

Ferns! What a strange interest! Over the past 55 years how often I have heard these words, or similar ones, aimed at me.

Up to the age of 29 I knew nothing about ferns, although I still remember very clearly, as a boy during the first world war while my Father was in the army, walking with my Mother along the side of a wood where a magnificent specimen of *Dryopteris affinis*, the Scaly Male-fern, was growing, a perfect shuttlecock of fronds 36 inches (90cm.) high. I admired it so much that I went back the following day, dug it up and transplanted it into a pot. How long it lived in that confined habitat I cannot say - no memory exists of its subsequent fate!

An exile from my native Scotland, immured in an international bank in the City of London, I looked forward eagerly to my annual leave when I could not get back quickly enough to my family home in Strathspey in the north of the country. On the way I usually interrupted my journey to spend a day or two with a close friend in Edinburgh. He was a keen gardener with a casual interest in ferns and had several Hart's-tongue Ferns, *Asplenium scolopendrium*, in a special corner. He wanted more and asked me if I could find him some up in the north where I was going. Oh! yes, I replied, there are plenty up in my part of Scotland. Arriving home, I told my Father, a professional gardener, of my quest, to be met with a very quissical look and the question - "Where are you going to find them?" On my blithely answering that there were plenty all round the area he dryly remarked that in this part of Scotland the Hart's-tongue Fern was completely absent. In parenthesis, if one looks at the *Atlas of Ferns*, published by the *Botanical Society of the British Isles* and the *British Pteridological Society* in 1978, it will be seen that there are, or were, only two post-1930 records for the area. Several years later, in the post-war period, I found this fern growing very rarely in the country just west of Inverness. The fern I was confusing with the Hart's-tongue was the Hard Fern, *Blechnum spicant* - so much for my knowledge of ferns!

BUT, an interest was kindled, and on my frequent walks in the surrounding countryside with my Father, who not only knew his garden plants well but the local flora as well, he fanned the flames by pointing out and naming the many local ferns to me. Two still remain fresh in my memory, the Oak Fern, *Gymnocarpium dryopteris* and the Beech Fern, *Phegopteris connectilis*. The beauty of these two ferns, seen for the first time with open eyes, completed my conversion to a new and absorbing interest and this was reinforced a few days later by seeing a tiny Oak Fern frond growing out of a hair-crack in the cement of a granite wall. I got my first lesson on spores from my Father,

and how this tiny frond was the result of a wind-blown spore from the colony seen a few days earlier, which was the only one in the area and two miles distant.

I could hardly wait to learn more about my new interest and one of the first things I did on my return to London was to phone my gardening paper, *Amateur Gardening*, asking them to recommend a book on ferns. The Editor, A J MacSelf, was an active fern-man whom I got to know well in the post-war years. He recommended *British Ferns and their Varieties* by C T Druery, and on my 30th birthday I was presented with a copy. It became a "bible" and was quickly absorbed from beginning to end.

Then, another piece of good fortune helped me on my way. A friend had recently got married and on a visit to meet his wife I was full of my new hobby. The lady remarked that her Uncle Joe was a fern-man and active in a society dealing with these plants. There was nothing for it - I *had* to be taken to visit Uncle Joe who lived at Great Bookham in Surrey. He turned out to be J J Sheldon, the Treasurer of the *British Pteridological Society* and a very active grower and breeder of ferns. I paid him my ten shillings (fifty pence) on the spot and became a proud member of our Society.

In those days I only had two weeks' annual leave from my work and always spent them at my parents' home in Scotland, so it was not till 1939 that I managed to attend the Society's Annual Excursion, held that year at Chard in Somerset. This introduced me to the fern riches of the West Country and awakened a love for this part of the country and its ferns which has continued strong and undimmed to the present day. During that meeting the then Secretary, Percy Greenfield, took me under his wing and he remained my beloved mentor until his death in 1970 at the ripe old age of 90 - I still have four more years to go to catch up with him!

That Meeting saw the end of ferns for the next eight years during which a war was fought and won. Back in "Civvy Street" in 1946 my thoughts returned to ferns and I eagerly waited to hear that the *British Pteridological Society* was coming to life again. I waited in vain, and at last I wrote to Greenfield who straight away came up to see me in London. It transpired that most of the Committee members, none of them young men, had died during the war years and the feeling among the remaining officers was that the Society should be allowed to fade away and die a natural death. This did not suit me at all - I had only recently, cutting out the war years, become infected with the fern craze, I still knew very little about ferns, and only through this Society was I likely to learn more. I prevailed on Greenfield to call a meeting of the remaining Committee members of which I was one, having been elected as Auditor at the 1939 meeting. Six of us met, in September 1947, W B Cranfield, President, P Greenfield, Secretary, A H G Alston, Editor of the *British Fern Gazette*, the Rev E A Elliot, Professor F E Weiss and myself. The general feeling was one of apathy, but I took a stand against it, Greenfield rallied to my side and we won the day. For my pains I was given the job of Treasurer which incorporated that of Membership Secretary, with a commission to gather together the straying membership which had been on the loose since 1939. Before the end of the following year, 1948, I had shepherded back into the fold 100 fully paid-up members and the *British Pteridological Society* was actively back in business again after evading an early death!

I have had my wish - I now know a *little* more about ferns! I often wonder what would have happened if my Edinburgh friend had not asked me to get him some Hart's-tongue Ferns! MY life would have been very much more empty but, no doubt, in time, someone else would have revived the British Pteridological Society.

NEW ZEALAND FERN SPECIMEN BOOKS ETC. - ADDITIONAL INFORMATION

MARTIN H RICHARD, The Old Rectory, Leinthall Starkes, Ludlow, Shrops. SY8 2HP.

In the 1986 *Pteridologist*, while listing all the commercially produced New Zealand fern albums I had been able to trace, I made a request for any additional information on the subject (Rickard). This provoked such a good response that I am now able to significantly supplement the original article. For additional information I would particularly like to thank Dr Patrick Brownsey of the National Museum of New Zealand, Wellington, Miss Jeanne Goulding, formerly of the Auckland Institute and Museum; Bolton Metropolitan Borough, Department of Education and Arts; Bridget Graham; J W Dyce, Miss Ruby G B Laidlaw and our Hon.Sec. Matt Busby. I am also grateful to the Natural History Museum London for finding several useful additional items.

All too frequently the dates of these items are not known; however, it seems reasonable to assume that most were produced in the period 1880 to 1900.

Additional specimen books etc. - commercially produced

(Anon.) *New-Zealand Ferns*. Beautifully bound in leather with title blocked in gold. 25 sheets, names in manuscript. 27 x 14cm.

Craig, E. *New Zealand Ferns*. 25 miniature sheets of dried ferns, 14 x 21 cm, printed labels. In a wooden box with a splashwork fern design on the lid, 19 x 27 x 5 cm (Goulding).

Craig, E. *New Zealand Ferns and Fern Allies*. Two sets each of 24 cards. Printed labels. The cards mounted on a folded sheet of paper such that when fully open all 24 specimens can be seen at once, 4 across and 8 down. There is no duplication between the two sets, i.e. there are 48 different specimens.

Craig, E. *New Zealand Ferns and Fern Allies*. Folio album with mottled kauri wooden covers. As entries in original list except;

An issue in Bolton Museum has 60 sheets with 118 specimens, 30 x 45 cm.

Another issue in Auckland Museum with 152 specimens, 32 x 45 x 10 cm (Goulding).

Another issue in the Natural History Museum, London.

The wooden covers for these books were made for Craig by Wilson and Horton (Goulding).

(? Craig, E.) *New Zealand Ferns*. Neatly bound in red cloth blocked in black. 20 sheets. Printed labels identical to those ? exclusively used by Craig. 27 x 32 cm.

Cranwell, T. (*New Zealand Ferns*) prepared and mounted by T Cranwell, Folio, 34 x 48 cm with wooden marquetry covers. Another copy as on the 1986 list except this one has fewer sheets (c.60), the central design on the cover is a display of two ferns (not one) and this copy comes in its own carved wooden case. The inlaid covers for these books were almost certainly made by Anton Seifert, a well known furniture maker resident in New Zealand in the late 19th century (Brownsey, pers.comm.).

Cranwell, T. Ferns were also mounted on cardboard in sets of 24 sheets (Goulding).

(? Cranwell, T.) (*New Zealand Ferns*). A quarto edition with the above type of marquetry cover is in the Auckland Institute and Museum, without preparer's label. 23 x 29 cm (Goulding).

(? Reid, W.) *New Zealand Ferns*. A quarto volume bound in brown cloth with the title blocked in gold on the cover, 24 x 30 cm. 30 sheets, but no author given; however, writing is unusual and indistinguishable from that used in the Reid volume described in the 1986 list. This book was given by C Howard Tripp of Timaru to Dr F F Laidlaw

in 1901 (R. Laidlaw, pers.comm.). There was a Miss A Reid who mounted ferns (Brownsey, pers.comm.) - is there a connection?

Tait, James. *Collection of West Coast Ferns, Lycopods and Mosses in Natural Colours (mounted)*. Hokitika. Printed title page plus 20 sheets of ferns. Fern names in manuscript. Most sheets arranged with lower margin dressed with mosses and lichens.

Wayte, Edward. Ferns mounted on boards or in books with carved mottled kauri covers, 100, Queen Street, Auckland (Goulding). I have seen a large collection of loose, but well presented, quarto boards prepared by Wayte. Each specimen was protected by a fly sheet.

Wildman, W. Addendum to the details published in the 1986 list. Miss Goulding (pers.comm.) has suggested a link with stationers Wildman and Airey at Auckland around the turn of the century.

Other Fern Specimen Books

There are probably large numbers of books in existence without printed labels. I have seen otherwise unlabelled examples with the following names added in manuscript:

Clark, Sir Mayfield.

Heape, Richard. 1876.

Leider, Louis - folio volume with manuscript notes on each species.

Tangy, Sir Richard.

Tinsley, William. 1891. Quarto, brown cloth album blocked in gold in same style as that sometimes used by Craig.

Wells, W.C.

as well as many totally anonymous volumes.

I had assumed that these were always "one offs" and privately compiled by amateurs but I am not now so sure since W C Wells is on record as having shown at least four albums in exhibitions (see below).

Other names associated with New Zealand ferns around the turn of the century were (Brownsey, pers.comm.):

Atkin, William. 1872. High Street, Auckland.

Burrett, R. Wellington.

Austin, Frederick. Fern collector.

Dall, James. Fern collector. *Pittosporum dallii* was named after him.

Harrison, Thomas. Fern collector.

Leighton, J F. Bookbinder and stationer, Shortland Street, Auckland.

There may be books in existence compiled by some, or all, of these people. I have never seen any but the names are worth looking out for.

Exhibitions of Dried Ferns

Several albums, or collections of pressed New Zealand Ferns, were exhibited during the later part of the 19th century (Goulding).

In Dunedin in 1865 the Governor General, Sir George Grey, exhibited a collection compiled by the Misses Sinclair of Auckland. Ferns mounted by St Johns College, Auckland were exhibited by Rev. Blackburn of Taranaki. John Buchanan presented 73 species of ferns from Otago, while H F Logan of Wellington showed "one of the best collections in the Exhibition".

In London in 1886 G K Burton of Nelson, T E Ellis of Wanganui and T C Tims of Te Puke all exhibited albums of ferns.

In Melbourne in 1888 W C Wells and J Marshall of Hokitika each showed two albums, while E Maxwell of Opunake exhibited a large collection of dried ferns.

In Dunedin in 1889-90 W C Wells of Hokitika again showed albums, this time entitled *Fancy Books of Specimen Ferns*, while C Hicks of Greymouth, Miss L Manis and Miss N Falla of Westport and G M Thomson of Dunedin all displayed dried ferns. In addition Miss M Barclay showed "Plush curtains, plush cushions and New Zealand ferns"!

The only examples of work by any of these exhibitors that I have seen are by W C Wells, and it may be that this album (entirely handwritten) was one of those originally exhibited at Melbourne or Dunedin, and G M Thomson author of the 1882 book *Ferns and Fern Allies of New Zealand*.

Printed Books on New Zealand Ferns - additional to the 1986 list

Details of Craig and Dobbie volumes from Goulding, 1977:

Brownsey, P J and Galloway, T N H. 1987. *A Key to the Genera of New Zealand Ferns and Allied Plants*. Wellington. 31pp.

Brownsey, P J and Smith-Dodsworth, J C. 1989. *New Zealand Ferns and Allied Plants*. Auckland.viii, 168pp.

Craig, E c.1888. *New Zealand Ferns, 167 varieties*. 104pp.

Craig, E c.1890. *Catalogue of Ferns and Lycopodiums in the Herbarium of Eric Craig, Princes Street, Auckland*. Birmingham, 31pp. (Not exclusively New Zealand ferns).

Craig, E c.1892. *New Zealand Ferns, 172 varieties*. Second edition. 100pp.

Dobbie, Herbert B. 1880. *145 Varieties of New Zealand Ferns, illustrated*. Either in 2 parts, pp.1-48 and 49-104, or 1 part pp.1-104.

Firth, S, Firth, M, Firth, E and Morrison, R 1986. *Ferns of New Zealand*. Auckland. 80pp.

Craig's two New Zealand books were little more than re-issues of Dobbie's work. None of these three books had any text but consisted of a collection of fern prints in white on a bright blue background - hence the descriptive name "Blue books".

These "Blue books" are very rare today and I know of no copies in the United Kingdom.

Correction to 1986 article: *Handbook to the Ferns of New Zealand* given as: Anon. c.1861, I now know to have been written by Mrs S Jones in 1860 (Brownsey, pers.comm.).

Footnote

For more information on many of the points raised in this article I strongly recommend Jeanne Goulding's article, see below.

References:

- GOULDING, J H 1977. Early publications and exhibits of New Zealand ferns and the work of Eric Craig. *Rec. Auckland Inst.Mus.* 14:63-79.
- RICKARD, M H 1986. New Zealand fern specimen books. *Pteridologist* 1,3:120-125.

ON THE TRAIL OF COLLECTIONS AND COLLECTORS PAST

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In this, our centenary year, we focus rather more than usual on the activities of the Victorian fern collectors and are fortunate in having an excellent supply of literature at our disposal with which to study them. When reading the old fern books, particularly Lowe's "Our Native Ferns", apart from the minute detail of the varieties themselves, one gains an insight into the activities of the *people* involved. The number of amateur pteridologists referred to when Lowe put quill pen to paper in 1864/65 leads one to wonder why we didn't celebrate our centenary twenty years earlier. And with so many collections evidently in existence at that time, how much remains awaiting rediscovery?



Forms of *Athyrium filix-femina* in the garden at Scarborough. a) Incised form. b) Plumose frond akin to 'Monkmanii'. c) Depauperate form.

With the sad loss of so many fine varieties earlier in the present century when horticultural fashions changed and whole collections were lost to cultivation, we should be especially conscious of the need to seek out and conserve what we can.

Returning to Lowe yields some clues as to which Victorian collectors may be worth tracing. Several of those mentioned are referred to again and again, and one can even begin to build up a picture of an individual enthusiast - their particular areas of interest, geographic "hunting ground", and success at raising new varieties from spores.

One such collector whose name appears frequently is "Mr Clapham of Ramsdale Bank, Scarborough". Here is a clear enthusiast with many finds to his credit, and being responsible for the several varieties bearing the name *Claphamii*. In *Athyrium* varieties alone, Lowe describes 18 varieties as Clapham's finds, a further 4 raised by him, and 8 where he is acknowledged as the grower of a scarce variety.

And so it was that, finding myself in Scarborough last autumn, I decided to attempt to trace the garden where such treasures as *Athyrium filix-femina* 'Acrocladon' were known to have grown in the mid 1850s and the 1860s. I will recount my experiences for the benefit of any like-minded pteridological historians. I started with the Postal Sorting Office which yielded no knowledge of "Ramsdale Bank" either as a house name, street name, or district - "And I've been here years, mate!".

Inspection of the local street maps providing no further clues, led me to the reference section of the local library to search the W H Smith Street Directories. The 1915 edition showed a house, Ramsdale Bank, situated at No 5, Belmont Terrace. There could, of course, have been other houses bearing this name fifty years earlier, but at least this street was in a part of the town which existed from pre-1850 and was also little-changed to the present day. The 1850 Ordnance Survey map yielded both Belmont Terrace and a single residence - Ramsdale Villa.

I was then thrown off the scent by the 1851 census, which was available on microfilm in the library and which showed no trace of a Clapham in the vicinity. However, the following census, 1861, did list one Abraham Clapham, retired wine merchant, living at 6 Belmont Terrace with his wife Mary and daughters Marian and Jessie. This left some confusion as to the precise location of the Clapham residence - further research showed the street to have been extended to form Belmont Road and renumbered, and Ramsdale Villa split, or rebuilt, with Ramsdale Bank standing on a plot precisely adjacent to it. Moreover, the latter plot was clearly shown on a later map as a substantial house with a conservatory and a large garden on a north facing slope.

Armed with my maps I set off to Belmont Road where I found the site now to be occupied by the Cumberland Hotel. The original Ramsdale Bank exists as the easternmost part of the hotel frontage which has been extended to fill part of the former garden. With the permission of the proprietor a search of the garden followed. Whilst the paths were still laid out as shown in the Victorian maps, I could find but three varieties - all lady ferns.

One was an incisum, another bore the marks of an early plumosum similar to Lowe's illustration of *A.f.f.* 'Monkmanii', and the third attempts rather unsuccessfully to combine several characters and is obviously a descendant from one of the treasures which once grew in that garden. Spores collected from the latter two may in due course provide further evidence of the fern wealth of our forbears. On the other hand, I suspect it will be more rewarding to follow a fresh trail....

ACKNOWLEDGEMENTS

My thanks are due to Miss Bishop and Mrs Monteith of the Cumberland Hotel and to Bryan Berryman at Scarborough Reference Library.

MORE ABOUT FERNS WITH OTHER PLANTS

PETER TEMPLE, *Wingfield, 2 Deneside, East Dean, East Sussex*

The last issue for 1989 of the *Pteridologist* contained an article by A R Busby under the title "Ferns with other Plants". This contribution provides much guidance and interest to us gardeners who, besides growing plants which can delight us, fight those which do not throughout the year; yes...weeds. However, there is a combination of "Ferns with other Plants" which are those which introduce themselves without help to another section of the garden; this is the greenhouse whether heated or not.

The average greenhouse is used for a number of different purposes; seed growing, tomato growing, pretty flowers to be taken into the house, with generally a row of raised shelving on one or both sides. Tucked away but clearly visible is a hotch-potch of objects, flower pots, sowing and potting composts, weed killing and fertilizing cartons or bags and puffers and maybe a variety of other objects. Even in those unimpressive and uninteresting structures there is no immunity from the softening effects of the minute intruders - fern spores, but rarely, because of the misguided outlook of some greenhouse owners, are the resulting sporelings allowed to 'disfigure and disgrace' that mishmash within the glazed walls.

These minute specks of life-to-be which float around us and, indeed, which we breathe can and do find their way into more welcome acceptance. I have the good fortune, pleasure and excitement of allowing these floating unseen specks to settle and germinate where they will in my greenhouse where, for some forty years or so, I have been collecting and growing members of the Pineapple family, the Bromeliacae together with members of the Cactaceae, the Rhipsalis. I cannot think of any plant more naturally suited to companionate Bromeliads and Rhipsalis than ferns of every species dependent only on the growing temperatures of a greenhouse such as I have and, particularly so, since I endeavour to provide an environment which gives a happy home to all three families where they can grow epiphytically, in the greenhouse soil and in the flower pots, living as near to their natural lifestyle which means taking the rough with the smooth.

It is very rewarding and surprising to see what results, and which find a happy home with the other genera. In addition to the wanderers, I have methodically blown fern spores received from the spore offers of the Society around the greenhouse so that natural growth results, sometimes in numbers and sometimes singly - and sometimes not at all!

My greenhouse presents a 'homely' greeting to the visitor - if she or he is able to get in - entirely due in my opinion to the association of my ferns growing among the bromeliads and rhipsalis. I do not have any staging. However I must say that occasionally I have to cull some ferns which seek to take over, but without them the greenhouse would not be so intimate if there were no ferns to soften the picture.

The ferns are not troubled by snails or slugs, but woodlice, which are a plague in this area, do cause some nuisance at times since they are very partial to bromeliad and rhipsalis flowers and seedpods. I have to weigh up carefully my method of control with liquid Derris and Malathion and dusting the junctions of floor and walls with Gamma BHC dust. Derris does not appear to disfigure the ferns but Malathion can and often cuts them down, but in most cases, sometimes after a very long interval, they will reappear. Literally I have to cut out fern plants from the bromeliads and rhipsalis before they smother but in most cases I replant them haphazardly.

I would say to those greenhouse owners who want a natural effect in their greenhouses of which they can be proud and 'at home', let nature do its job for them and perhaps aid them in concealing their brickabrack which is found in the greenhouse and thus give a friendly and natural touch. Of course there is a wealth of other combinations

of 'Ferns with other Plants'.

Over so many years some of the ferns growing among the bromeliads and rhipsalis in my greenhouse which have 'dropped' in or have resulted from the spore offers are -

Adiantum - a variety of these including the tiny *A. raddianum* 'Gracillimum', the Five Finger Fern *A. hispidulum*, *A. pedatum* and *A. capillus-veneris*.

Asplenium nidus the 'Birds Nest Fern', and *A. falcatum*.

Doryopteris sp.

Drynaria rigidula the 'Oak Leaf Fern'.

Cryptogramma crista the 'Parsley Fern'.

Cyclosorus in varying forms differentiated by the separation of the blades. Very prolific.

Cyrtomium falcatum 'Rochfordianum' the Japanese Holly Fern. Very prolific.

Cystopteris bulbifera the 'Bladder Fern'.

Davallia sp.

Lygodium palmatum the 'Climbing Fern' - very tender and delicate.

Microlepia speluncae

Pellaea ovata the 'Button Fern'.

Pellaea calomelanos the 'Hard Fern' - fairly prolific.

Phyllitis scolopendrium the 'Hart's-tongue Fern' - very prolific.

Platycerium bifurcatum the 'Stags Horn Fern'.

Polypodium diversifolium - very prolific.

Polystichum sp.

Pteris argyraea.

Pteris cretica.

To close I must tell you that in my Living Room I have a light fawn coloured armchair, very near to a large Japanese Holly Fern (a beautiful specimen), which each season is turned to light brown colour by the wealth of spores settling on it - but as yet no sporelings have appeared!

WILL THE REAL ADIANTUM MONOCHLAMYS PLEASE UNFURL!

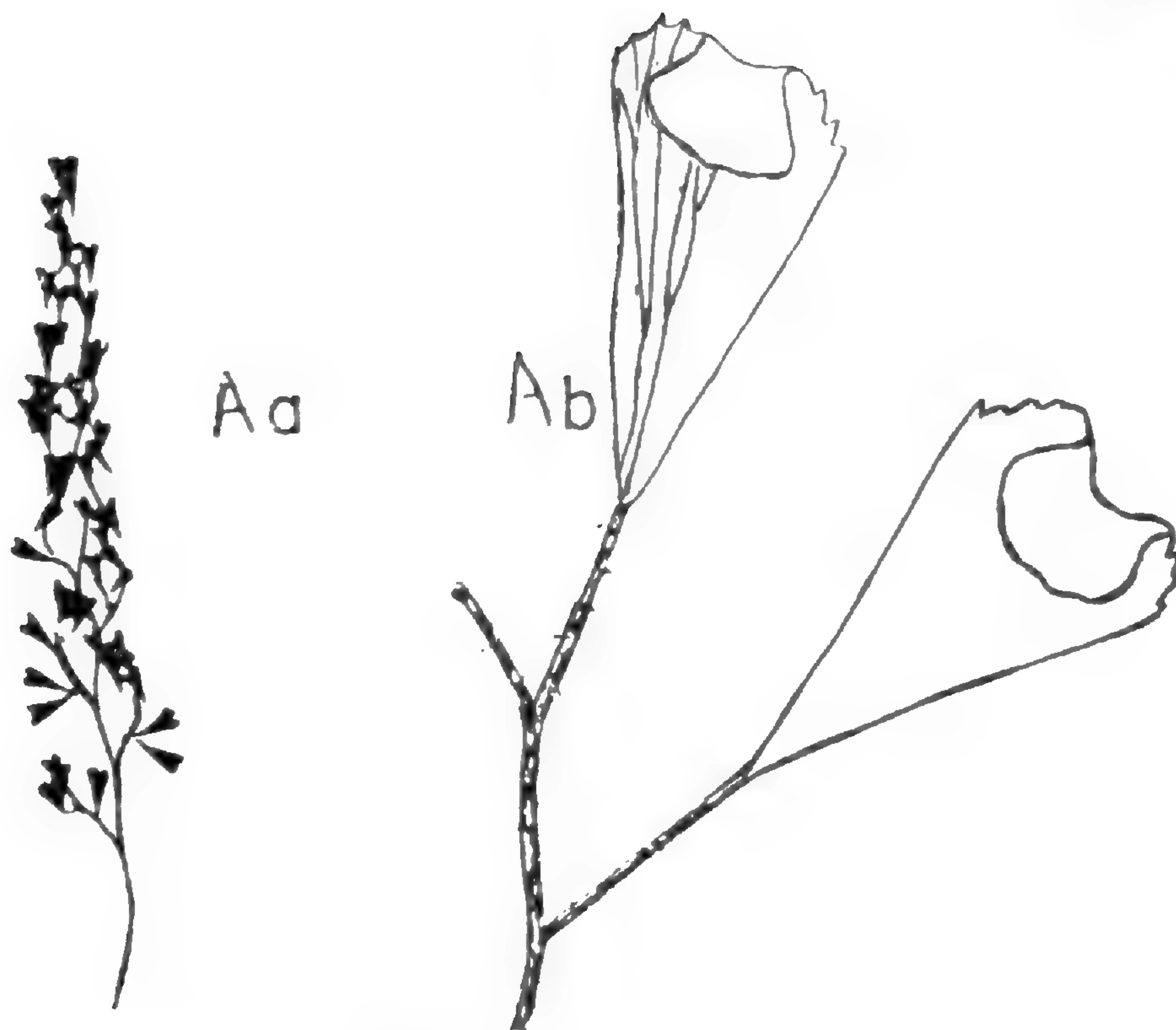
A R BUSBY, 16 Kirby Corner Road, Canley, Coventry

In recent years there has been a great deal of interest by many members in acquiring *Adiantum monochlamys*. Puzzled by this enthusiasm and not knowing the fern, I asked a fellow member, Why all the fuss? "Because it's so beautiful"! came the reply.

I was anxious to meet this paragon that appears to elude fern growers. I thought my chance had come a little while later when, visiting a garden I know with a small fern border, I was pleased to find a small fern labelled *A. monochlamys*; however, delight turned to disappointment when I found myself staring at *Adiantum venustum*. Even I have got that so why all the fuss?

Sometime later I had the chance of discussing this with a notable fern grower. "Please", I enquired, "how do you separate *A. monochlamys* from *A. venustum*"? Came the reply, "*A. monochlamys* has only one sorus per pinnule". My face dropped - is this what all the fuss is about? Surely not.

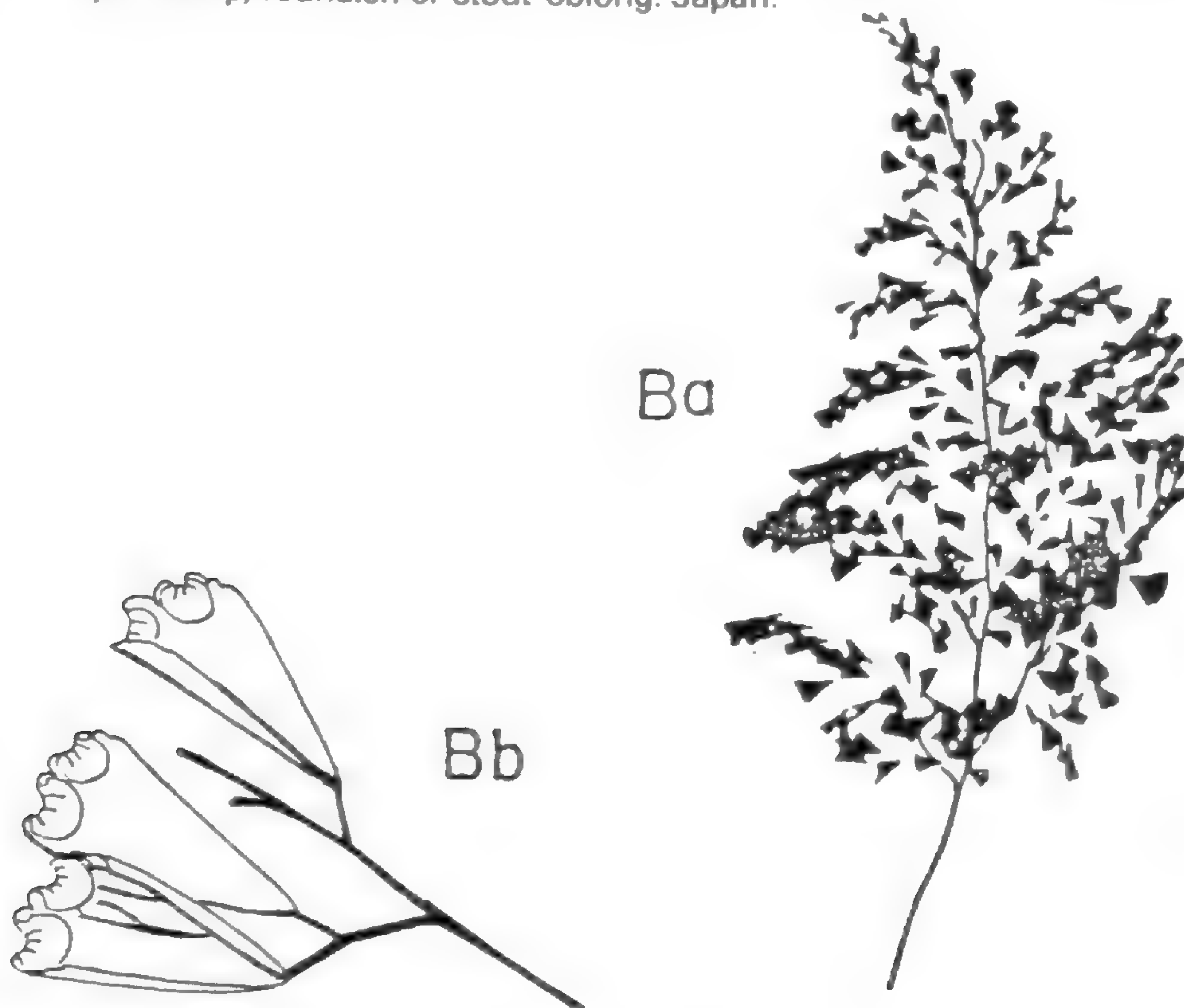
At Southport Flower Show, I was asked to check the names of hardy ferns on a nearby stand and I was pleased to see that all the ferns were correctly labelled. I then found myself in front of a label proudly proclaiming *A. monochlamys* but wearing the disguise of *A. venustum*. I carefully lifted a frond to peek at its 'private parts'. Bless my soul!, it had mostly one sorus per pinnule, was this the 'Eldorado' of my searches?



A. *Adiantum monochlamys*: a, frond x 2/7; b, fertile segments x 3.

A. monochlamys D. C. Eaton

Like *A. Capillus-veneris* and related members in having the veins of the segment ending in the teeth of the margin, but differing from all in having only one sorus, rarely two, per segment, the false indusium quite deep, roundish or stout-oblong. Japan.



B. *Adiantum venustum*: a, frond x 1/4; b, fertile segments x 2 1/2.

A. venustum D. Don.

Rhizome long-creeping, the frond much like those of *A. Capillus-veneris* and *A. bellum*, but closer to the latter, the marginal teeth of the segment finer, more regular, distinctly cartilaginous, the false indusium shorter, not more than 2 times as long as wide, the margin of the false indusium not erose (notched) as in *A. bellum*. Himalayan Mountains, India.

(Both Figs and captions from Hoshizaki, in *Baileya* 1970)

Further enquiries revealed that it had come from a fern nursery 30 years ago. I was kindly given a fertile frond to press and take home to compare with my own *A. venustum*. They were virtually identical. Searching through various fern literature, *A. monochlamys* was often mentioned but never illustrated, very frustrating. However, on page 182 of Hoshizaki (1970), there is a small silhouette illustration of *A. monochlamys* and a line drawing of two pinnae showing one sorus per pinnule, the entire thing looking nothing like *A. venustum*.

A. monochlamys is described as having one, rarely two, sori per pinnule yet all the material I have examined has had commonly two, sometimes three, sori per pinnule.

Determined to persist with my searches, I enquired of yet another colleague if he had *A. monochlamys* and, if so, would he send me a fertile frond. This he did and at first, I was sure that I had received *A. monochlamys* but, by carefully comparing it with both *A. venustum* fronds and the descriptive material in Hoshizaki, I found no clear indication that I had indeed received material of *A. monochlamys*. At the time of writing, I am still looking for this elusive fern so if any member can furnish me with fertile material, will the real *A. monochlamys* please unfurl.

Throughout this note I have changed events slightly and mention no names to spare blushes.

References:

HOSHIZAKI, B J 1970 The Genus *Adiantum* in Cultivation. *Baileya*, Vol.17, 182-183.

SHORTER NOTE

How to use a hand lens

Principle:

Using a hand lens is much like looking through the key-hole of a door. If you stand away from the door you can see nothing; however, if you put your eye to the key-hole, all will be revealed. So it is with a hand lens - try to use it as a magnifying glass and you will see nothing but put the hand lens close up to the eye and you will see everything in close-up.

Method:

Hold the hand lens between thumb and forefinger and rest forefinger on eyebrow and thumb on cheekbone: this holds the lens steady against the eye.

With the other hand hold the object to be viewed with the thumb and forefinger. Now with the lens against the eye, rest the base of the thumb holding the object against the base of the thumb holding the hand lens; both lens and object are thus held steady. Always ensure that you have a good light source shining on the object.

With a 10x hand lens the working distance, ie. the distance between lens and object, is about 20mm ($\frac{3}{4}$ inch). The object can be brought into clear focus by carefully adjusting the working distance. Lenses with higher magnification have shorter working distances, eg. a 20x lens will have a working distance of about 8 mm ($\frac{5}{16}$ inch).

To practice, try examining the cuticle of the thumb nail that would be holding the object.

A R BUSBY

BOOK REVIEWS

COMPUTER KEY TO THE FERNS OF THE BRITISH ISLES (Written, produced and distributed by Pat Hill-Cottingham and Alan Morton, Blackthorn Cottage, Chawridge Lane, Winkfield, Windsor SL4 4QR. Disc, 5¼" 360k for IBM-compatible MS-DOS PC. Price approximately £10.

This is a computerised multi-access key. The program contains a main key covering British fern species and six sub-keys each covering a small, difficult group of taxa. The user selects a key and is presented with a list of diagnostic characters from which one is chosen. A list of corresponding character states is displayed, from which one must be selected. Following this, a reduced list of possible taxa is shown and the diagnostic characters offered again. The process is repeated until only one possible taxon remains.

Instructions, a glossary of terms, a list of characters and the results of a diagnosis can be printed from within the program. A printed set of instructions and a sheet of diagrams to illustrate the glossary are included.

The program is intended for use by Country Trusts, Reserve Managers, Field Course Tutors and anyone interested in identifying ferns.

The program is easy to use following the clear instructions. The program takes the user step-by-step through the process by means of self-explanatory screen menus and prompts. There is no facility within the program to enable changes or extensions to the taxa or characters, but examination of the structure of the files on the disc reveals that this would be simple to accomplish.

There are a number of errors and confusing points such as the sub-key called 'Polystichum spp. (Shield-Ferns)' only containing two of the three native species of *Polystichum* and the inclusion of a number of characters in the 'Dryopteris affinis' sub-key which are not linked to the taxa concerned and hence have no effect on the diagnosis when invoked.

The main key generally produced a correct diagnosis when tested but the sub-keys proved much less successful, regularly reaching an incorrect conclusion. This is due to the fact that the characters offered are significantly overlapping in many cases, being based on a description rather than a diagnosis.

There is very little available in the way of computer aids to identification and attempts like this should be welcomed and encouraged. However, the implementation here is in danger of falling between two stools, in that results from the reasonably accurate main-key could be achieved without the trouble of a computer, and the potentially much more useful specialised sub-keys are too inaccurate and simplistic. Problem areas like those covered in the sub-keys need a more sophisticated approach, such as comparison methods using Bayesian probabilities, to be really useful and thus warrant the inconvenience of using a computer rather than a paper key.

ANTHONY PIGOTT

GUIDE DES FOUGERES ET PLANTES ALLIEES by Remy Prelli, second (revised) edition, pp.vi.232; figs.76. 14x20 cm. Text in French. Editions Lechevalier, Paris. 1990. Price 220 FF.

After a period of many years with no book on French ferns in print, the publication of the first edition of this book in 1985 was extremely welcome. The appearance now of a more comprehensive volume will surely further boost interest in the marvellous fern flora of France.

This book differs from the first edition in many ways. The introductory chapters have been slightly condensed, while the systematic section has been expanded by about 50

pages. This extra space has allowed a clearer format for generic and specific headings to be adopted, making the book easier to use. Full dichotomous keys are given down to specific level. All hybrids are listed and most are described (except, curiously, *Asplenium*). There have been some nomenclatural changes, I welcome *Cystopteris alpina* being reinstated in favour of *C. atrovirens*; others are new to me eg. *Cheilanthes acrostica* for *C. pteridioides*, while I regret that, perhaps inevitably, *C. dickieana* has been retained.

The black and white photographs have almost all been replaced by excellent line drawings; these are often a vast improvement, especially in *Cystopteris*, *Asplenium* and *Dryopteris*. Descriptions down to subspecies level are particularly good, eg. in the *Asplenium trichomanes* and *Dryopteris affinis* complexes. In the latter case there is an excellent diagram showing the inter-relationships between the species and hybrids. Finally, the bibliography has been completely updated, but on the debit side the index is still frustratingly difficult to use with entries at generic but not specific level.

I liked the first edition of this book and in this revised form it is greatly improved. I feel it can be recommended to botanists with an interest in French or European pteridophytes. Unfortunately, however, the price (about £23) will be too high for many.

MARTIN RICKARD

FERNS AND FERN ALLIES OF CANADA by William J. Cody and Donald M. Britton. 430 pp. The Canadian Government Publishing Centre. Supply and Services Canada. Ottawa, Canada K1A 0S9 ISBN 0-660-13102-1 Price \$38.50. Also published in French under the title: *Les fougères et les plantes alliées du Canada*.

On holiday in Canada I was delighted to discover this recently published book. The ferns of Canada are much more diverse than those of Britain and even some of the familiar species have a slightly alien look, so it was most helpful to have this book for identification and explanation.

The book has a familiar appearance, for one is strongly reminded of Chris Page's book, *The Ferns of Britain and Ireland*. Both books are exactly the same dimensions and in soft covers. The Canadian book is laid out somewhat differently, the ferns being listed systematically rather than alphabetically. The distribution maps are all together at the back, which is a little awkward but all the maps are very clear and the line drawings of the plants are often quite life-like.

The book is very readable, even for the layman, and there is a useful glossary of botanical terms near the back.

Each fern is described and the cytology, habitat and range are given. The 'Remarks' on each fern are fascinating and useful, and give many interesting details, for example, explaining why the bracken I saw did not look like the British equivalent at all.

I was a little surprised to see *Phyllitis* still included as a family but realise this is still the subject of botanical argument.

I was very pleased with this book and can recommend it without reservation. It will be of particular interest to anyone visiting Canada and also to fern growers who like to grow species from other countries. I am sure that many of the ferns described would be welcome visitors to a British garden.

This book is now available from: Books Express, P.O. Box 10, Saffron Walden, Essex CB11 4EW.

A H OGDEN

BOOK REVIEWS

FERNS OF PUERTO RICO AND THE VIRGIN ISLANDS by George R. Proctor, *Memoirs of the New York Botanical Garden, Volume 53, 1989. 399 pp., 110 figs. 180 x 254 mm. Price \$85.50.*

The fern flora of Puerto Rico has been studied, on and off, during most of the twentieth century, but this is the first book of the fern flora to be published. It is also the latest in the author's series of books on the ferns of the West Indies, following on after *Flora of the Lesser Antilles, Volume 2, Pteridophyta* (1977) and *Ferns of Jamaica* (1985).

376 species are recognised here, an increase of 56 over the number given in the most recent list in *Flora of Puerto Rico and adjacent islands* by Liogier & Martorell (1982). Twelve new species or combinations are given and 22 endemic species described.

The introductory sections are brief but to the point and include some useful maps of geology, topography and climate as well as a short account of some aspects of Puerto Rican fern ecology. The systematic section is very similar to that in *Ferns of Jamaica*, i.e. there are full dichotomous keys, synonymous names, descriptions, details of distributions and habitats.

The book is well illustrated. About 139 species are depicted in line drawings or in photographs, mainly of herbarium material. Some of these illustrations were specially drawn for this book but many are recycled from the author's, and other works, covering the ferns of the West Indian region. At the end of the book there is a useful list of the ferns of each of the Virgin Islands, a checklist of all the fern taxa known in Puerto Rico, a glossary and a bibliography.

In summary, this book is produced to the high standard we have come to expect from the author and it is strongly recommended to anyone interested in the ferns of the central American tropics.

THE CORNISH FLORA SUPPLEMENT 1981-1990 by L J Margetts and K L Spurgin, 1991. Trendine Press, Cornwall. About 120 pp. plus map. 140 x 210 mm. Price £14.95

Cornwall has one of the most interesting pteridophyte floras in England and a supplement to its flora is very welcome ten years after the main *Review of the Cornish Flora 1980* by Margetts and David. Only new records are given here; therefore, for a full, up-to-date picture of the county flora both volumes are needed.

Perhaps of greatest interest is the batch of new records for *Huperzia selago*, rare in lowland Britain, but I am also fascinated by the large number of introduced pteridophytes now established in the county; *Selaginella kraussiana*, *Pteris cretica*, *Dicksonia antarctica*, *Polystichum falcatum*, *Blechnum chilense* and *Azolla filiculoides*.

Although only a supplement, there are interesting new pteridophyte records in this book that will necessitate reference to it when a visit to Cornwall is in prospect.

REAP A DESTINY by T D V Swinscow, 1989. 334 pp., 135 x 220 mm. Price £14.95 post free, from BMJ Bookshop, BMA House, Tavistock Square, London WC1H 9JR.

Although in no way a fern book this autobiography by a member of this Society for 39 years cannot go unmentioned. It is a very readable volume which I am sure those members who have had the pleasure of knowing the author will find of great interest.

MARTIN RICKARD

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PTERIDOLOGIST

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THE
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SOCIETY

PTERIDOLOGIST

Edited by
M.H. Rickard



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The BRITISH PTERIDOLOGICAL SOCIETY was founded in 1891 and today continues as a focus for fern enthusiasts. It provides a wide range of information about ferns through the medium of its publications and available literature. It also organises formal talks, informal discussions, field meetings, garden visits, plant exchanges, a spore exchange scheme and fern book sales. The Society has a wide membership which includes gardeners, nurserymen and botanists, both amateur and professional. 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*, Society business and meetings reports.

Membership is open to all interested in ferns and fern-allies. **SUBSCRIPTION RATES** (due on 1st January each year) are Full Personal Members £12.50, Personal Members not receiving the *Fern Gazette* £9.50; Student Members £7; Subscribing Institutions £20. Family membership in any category is an additional £2. Applications for membership should be sent to the Assistant Secretary (address above) from whom further details can be obtained. (Remittances made in currencies other than sterling are £3.00 extra to cover bank conversion charges). Airmail postage for all journals - an extra £4.00, or for those not receiving the *Fern Gazette* £2.50.

(Front cover: *Osmunda regalis*, the frontispiece of Linton's *Ferns of the English Lake District*)

Back numbers of the *Gazette*, *Pteridologist* and *Bulletin* are available for purchase from P.J. Acock, 13 Star Lane, St. Mary Cray, Kent BR5 3LJ, from whom further details can be obtained.

PRESIDENTS LETTER

Mille Ante Bis Millisimum Annum

What a year 1991 has been with the many and varied activities which have been so well organised to cater for everyone during our centenary celebrations. Unfortunately, even though the memories are still in our minds, the events are now in the past and our one hundred and first year is with us, so instead of looking backwards to those celebrations our thoughts must now be directed to the future of this great Society

There are two very important ingredients of a good thriving society, these being membership and enthusiasm. Regarding membership, it is a recognised fact that members are going to be lost through a variety of reasons and, to keep this side of the Society in a healthy condition, it is vital that new members are introduced and that there is a gradual increase or growth in the number of people joining us. My aim for this increase is contained in the heading which, translated, means 'One thousand before the two thousandth year' or, looking at it broadly, a thousand members before the turn of the century. With the increasing interest in ferns countrywide this should not prove to be a formidable task.

If every member is enthusiastic enough to try to make sure that they make at least one new introduction before the end of 1999, I am convinced that, after allowing for natural wastage, such growth could be achieved. Personally, I think it could be done long before the end of this century. **Why not have a go?**

There are many activities arranged by our Meetings Secretary and his Committee and there are also more arranged by Regional groups, and all members are encouraged to get along to these. They are pleasant, educational and healthy activities, enabling everyone to make or renew acquaintances, exchange views and also to make suggestions for future gatherings.

Hoping to see many of you during the coming year and wishing you much success in your chosen activities.

JACK BOUCKLEY

TRIBUTE TO REGINALD KAYE ON HIS 90TH BIRTHDAY

J.W. Dyce, 46 Sedley Rise, Loughton, Essex IG10 1LT.

Reginald Kaye was 90 years old on the 11th of April, 1992, and the BPS cannot let the opportunity pass to pay tribute to him, our longest surviving member - he joined the Society in 1929, several years ahead of me, and he, Jean Healey and I are the only survivors of the pre-war membership.

From his earliest years ferns have been one of Reg's great interests, in addition to his love for alpinists. After spending some years with Ingwersen's nursery at Gravetye in Sussex he moved back up north to Silverdale where he acquired Waithman's nursery. There, on the limestones he loves, he devoted his life to alpinists and to ferns, eventually becoming our foremost fern nurseryman with his very comprehensive collection of varieties of British ferns. It could have been better still if he could have afforded to buy Cranfield's huge collection which was offered to him for £500 at a time when that sum was a lot of money and beyond Reg's reach. Eventually, on Cranfield's death, that priceless collection was *flame-gunned* - a very painful story which I have narrated elsewhere. Instead, why could not Cranfield have passed the collection on to Reg in his will?

MISSOURI BOTANICAL

AUG 29 1992

GARDEN LIBRARY

Reg was elected our President in 1963 to 1966, a very popular choice, and his nursery has been a mecca for fern lovers world-wide in the post-war years. Ferns from his nursery now have their homes in many countries, particularly in the United States. Some years ago he did a lecture tour of that country and endeared himself to fern growers there.

In 1968 he published his book, *Hardy Ferns*, which has become a "bible" for fern growers and lovers in many countries. The book is now out of print and in recent years Reg planned to write a second edition which is badly needed. Most unfortunately, his present state of health has prevented him from completing the work.

In recognition of his great services to our Society and to the fern cult Reg was awarded in 1975 our Society's greatest honour, the Stansfield Medal. He is also an Honorary Member of the Society.

Sadly, Reg has been in indifferent health for some time but his indomitable spirit keeps him going. His many friends wish him well on the occasion of his 90th birthday.

SHORTER NOTE

Divide as a Rule

In the past, when exhibiting hardy ferns was a commonly enjoyed pastime, it was a general rule that ferns with an erect rootstock, such as *Dryopteris*, *Athyrium*, *Polystichum*, etc, were exhibited as single crowns. An untidy tangle of fronds did not attract our forebears.

I, too, think that single crowns are more attractive, both on the show bench and in the garden.

Ferns grown as single crowns display their various features more effectively, especially if they are named forms.

I now make it a habit to reduce all my ferns that are developing multicrowns to single crown plants which are then re-planted in threes or fives, thus not only ensuring a good stand of ferns but also enabling them to display their features to the best effect.

This job needs to be done every four years or so, depending on how vigorous a particular species or variety may be. This year I lifted a large clump of *Polystichum setiferum* 'Plumosum Bevis' which had not been divided for ten years. Pulling the crowns apart is out of the question so you must resort to the time-honoured method of using two border forks back to back to gain maximum leverage. Begin by placing the forks in the centre of the clump and forcing it into two halves. The clump will separate naturally between the crowns. Then divide the two halves and continue in this manner until the clump has been reduced to several single crowns. You will find that they will separate with the minimum of damage to the roots. They can go back in the same place but replenish the soil by forking in a bucket or two of leafmould or garden compost with a handful of blood, fish and bone fertiliser. Ensure that they are planted firmly so that the crowns are snug into the ground otherwise the soil will sink leaving the crowns proud of the soil and prone to collapse or drying by the wind. After planting, water well and top dress with a suitable mulch while the ground is moist.

Next year I shall be lifting several varieties of *Dryopteris affinis*; this will be done in March, weather permitting, so that once again, they will look their best for the coming season.

A R BUSBY

AQUATIC FERNS (Based on a talk given at the autumn indoor meeting at Kew, 1991)

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As the name implies, aquatic ferns grow in water. Some of them can withstand long periods of drought which will leave them growing above the water level. They have been around for a considerable period, there being fossils of *Isoetes* from the Triassic period which lasted from 225 million years until 190 million years ago down to *Salvinia* from the Cretaceous period - 136 m. til 65 m. years ago.

However, this article is mainly for the keen fern grower and collector. Remember that what suits plants in my gardening conditions will not necessarily suit those away from Yorkshire. Experimenting is essential. My garden is clay and the water is neutral to acid, having come down from the peaty moors. However, let's get down to the first of the alphabetically arranged plants.

Firstly, *Azolla*. There are a number of these but the one normally seen in this country is *A. filiculoides* (Fig. 1a) and it is not a British native. It is a free-floating fern which will form colonies on ponds where it will propagate itself readily by self-division, even to becoming a nuisance and having to be thinned out. This is quite easily done with a fish-net or by hand. It is an attractive little plant, sometimes turning pink in autumn, and it may die down to a floating or sinking bud which can grow again the following season. Try it in a small container, such as a 5-litre ice-cream tub or a fish-tank. It is not hardy so will need frostfree conditions in winter.

Next comes *Ceratopteris thalictroides*. This is a tropical plant which will grow anything from 6 to 15 inches (15-38 cm) tall and is an ideal plant for a well-lit heated tropical fish-tank. Plantlets are produced on the fronds from which they will self-detach and then float about until they find a place to root. The bright-green fronds will push above the surface of the water, displaying their fine divisions. Economically, it is quite an important plant as it is eaten raw or cooked in many countries.

Natives of this country are *Isoetes hystrix* (not a real aquatic), *I. lacustris* and *I. echinospora* (Fig. 1b and 1c) - the spring and the common quillworts. To see them in the wild where they can form carpets on the bottom in water usually under 12 feet (4 metres) deep but they can occasionally be found in 18 feet (5 metres) deep lakes.

To keep these at home, plant in an aquarium or container in a compost of poor nutrient value and the water must have a very low calcium content. Some people recommend starting them off in distilled water. I use ordinary soft tap-water. They are well worth trying if you can get plants.

Now we come to more introductions to this country - the Marsileas. They have a distribution covering many parts of the world, but *M. quadrifolia* came here from Europe where it grows in margins of lakes and also in boggy places. My method in this country is to plant it in a large plastic container and then submerge the whole lot into a pond so that the rim of the container of neutral compost is two or three inches (5-7 cm) below the water surface, then the four-lobed fronds will push their way above the surface, looking like a lush stand of clover. In the evening the fronds fold up to triangles the same size as one of the lobes. *M. quadrifolia* can also be found with incised fronds.

Another marsilia, *M. drummondii* (Fig. 1d) is very attractive, being covered with silvery hairs, the density of which depends on the depth of water. Try plants at different depths to find which is best for your conditions. This plant is not quite as hardy as the *M. quadrifolia*. I take all my plants into a frost-free greenhouse in late autumn for overwintering. In the winter of 1990-91 the frost-free qualities of my greenhouse failed and everything was frozen solid down to 12° F. (-12° C.) *M. quadrifolia* survived but

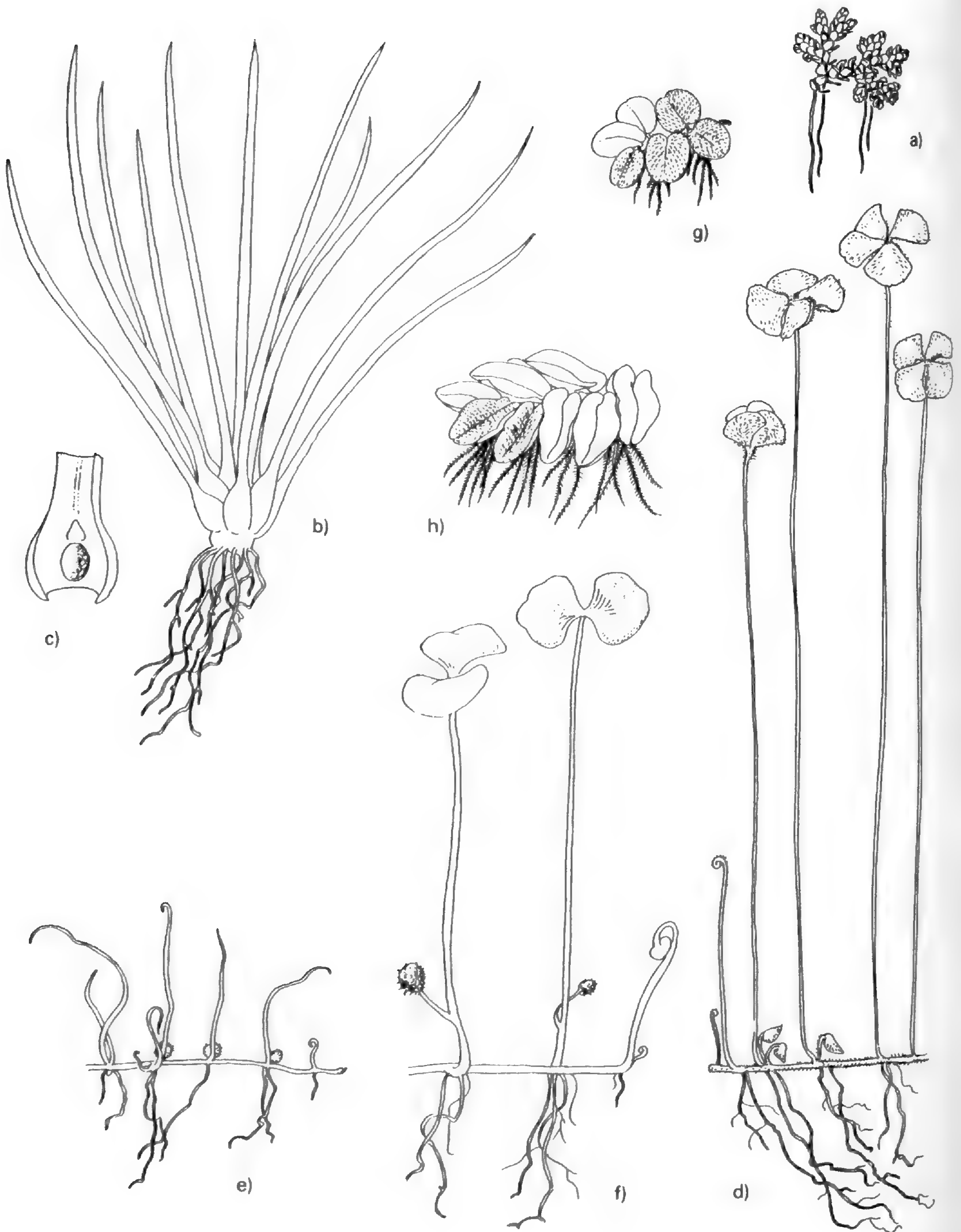


Fig.1
 a) *Azolla filiculoides*. b) *Isoetes echinospora* c) *I. echinospora* quillbase.
 d) *Marsilea drummondii*. e) *Pillularia globulifera* f) *Regnellidium diphyllum*.
 g) *Salvinia natans*. h) *Salvinia auriculata*.

M. drummondii died. Anyone in the south could try a well-rooted *M. quadrifolia* round the shallows of a garden pond, planted straight into the mud. It would be interesting to know if they are winter-hardy in parts of this country.

All marsileas can be easily propagated from pieces of rhizome, in the right conditions.

Pillularia globulifera (Fig. 1e) is another British native which is causing concern owing to its disappearance from many sites all over Europe. This again can be easily grown from pieces of rhizome which wander across the surface of the mud in shallow water. It normally grows to about four inches (10 cm) tall and is sometimes free-floating until it finds a place to root. In the garden, it is best in a pot of soil-based compost with the whole pot submerged about two inches (5 cm) under water, when the un-fernlike fronds will show above the water, looking more like a small sedge or rush. They may die back in winter but will revive again the following spring. The colour is bright-green and, kept in the close confines of a container, they will form a lush dense growth. It will withstand periods of drought. A pot of them in an aquarium would make very good shelter for fish spawn and fry.

Another clover-like plant is *Regnellidium diphyllum* (Fig. 1f). This a tropical plant from South America and its common name is the Latex Fern, as the stem, if broken, will exude a white latex substance. It will grow to a foot (30 cm) or more in height and has bi-foliar leaflets at the top, each lobe being up to four times as big as the *Marsilea quadrifolia* lobes. Propagation, again, is easy by rhizome. It will adapt very well to conditions in a heated aquarium, or in any other heated area, in a pot of poor soil with the base permanently in water. It is not at all hardy and it intensely dislikes alkaline water.

Salvinia is another floating fern with two distinct types of fronds (Figs. 1g and 1h). The buoyant frond which can be seen on the water surface is sterile but has two main uses - firstly, to keep the plant afloat and secondly, to take in nutrients by photo-synthesis. Under water, looking more like a frond skeleton, is the other frond which is sometimes, but not always, fertile. The plant readily divides and will quickly form quite attractive masses on the surface. It is not hardy.

For the enthusiast, the plants mentioned can be propagated by placing the sporocarps, which they all produce, in water and waiting for nature to take its course. The sporocarps of the *Marsilea* should be abraded (about $\frac{1}{2}$ of a millimeter cut off at the end) so that the white interior can only just be seen, but not damaged. A petri dish is ideal as a container.

I must thank Mike Hill of York University for the remarkable illustrations.

SHORTER NOTE

Dicksonia antarctica and *Dicksonia fibrosa* - a correction

In the 1990 *Pteridologist* I discussed ways of distinguishing *Dicksonia antarctica* from *D. fibrosa*. Since then the characters described have not proved 100% reliable on their own. I now know that it is most unlikely that any established Cornish specimens are *D. fibrosa*. The confusion has arisen because *D. antarctica* apparently varies from north to south in its range in Australia (Chris Goudey, pers. comm.). The forms grade into each other but at their geographic extremities are quite different. Some stands do approach *D. fibrosa* in pinnule, pinna and frond shape, and cannot, therefore, be reliably separated by frond silhouettes alone. The following article by Dr Chirs Page gives a full account of the better key differences.

MARTIN RICKARD

THE TAXONOMY AND IDENTIFICATION OF AUSTRALIAN AND NEW ZEALAND DICKSONIA TREE FERNS IN CULTIVATION IN BRITAIN

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Of the four species of the austral tree fern genus *Dicksonia* that are present in Australia (from southern Queensland to Tasmania) and New Zealand, one, *D. lanata* Colenso, is usually not of tree dimensions, and so is not included in this account. Of the tree-forming species, *D. squarrosa* Spreng of New Zealand is especially distinctive in appearance. By contrast, *D. fibrosa* Colenso of New Zealand and *D. antarctica* Labill. of Australia form a closer species-pair, and can be more difficult to separate.

In the Temperate Fern-Houses at the Royal Botanic Garden, Edinburgh, and at Glasgow Botanic Gardens, many fine specimens of these tree-ferns (totalling over 100 individuals, many well over a century old) have long been cultivated in comparable conditions of soil and climate. The differences reported here are mostly based on observations made on these specimens, backed-up by field and herbarium study.

Dicksonia squarrosa

Plants of *D. squarrosa* form long-fronded, slender-trunked individuals 8 - 20 cm in stem diameter, reaching 2-4 m high in cultivation, but up to 6 m in the wild (Page & Bennell, 1986). Unlike the other two species, the trunks scarcely secondarily thicken with old root masses, and so the persistent leaf-bases remain mostly exposed, covered in rigid, dark, perpendicular blackish hairs. Beneath the crowns, old fronds are shed from the trunk as they die, to accumulate in large numbers beneath the trees (Page & Brownsey, 1986). Underground rhizomes usually link the plants, which consequently form quite dense groves. The fronds of mature plants are similar in size to those of *D. antarctica*, but are distinguished by having much longer stipes, up to about one third of the length of the frond, which are dark in colour. The pinnae are typically quite widely spaced along the frond, with a very glossy upper surface, and a texture which is harsh to grasp.

Dicksonia fibrosa

Plants of *D. fibrosa* form relatively short-fronded, moderately thick to thick trunked trees (usually 25 - 30 cm diameter in cultivation, but exceptionally up to 60 cm in the wild) which are usually about 2 - 7 m high (Page & Bennell, 1986). Like *D. antarctica* (see below), the trunks secondarily thicken with a dense weft of old root masses, hiding the persistent frond bases, and giving the trunks a tawny grey-brown colouration. Beneath the crowns, old fronds usually persist in moderate numbers to form a pendulous skirt, except in tall trees in the most exposed situations (Page & Brownsey, 1986). Unlike *D. squarrosa*, plants are not linked by underground rhizomes, and so grow individually. The fronds of mature plants are usually about 100 - 160 cm long, and the stipes are very short and pale with only moderately long (c. 1-1.5 cm), soft, lax brown hairs, which are usually tenaciously retained by the plant when lightly pulled. The pinnae, which continue nearly to the base of the frond, are typically very numerous and each narrow but closely-spaced, with a glossy upper surface, crisply undulate pinnule margins, and a texture which is especially harsh and prickly to grasp. Frond outlines tend to have a distinctive widest point about two thirds from the frond base, tapering fairly abruptly but more gradually below this point. Throughout the frond, the fairly stiff and straight pinnae tend to be angled forward at about 30 degrees from perpendicular.

Dicksonia antarctica

Plants of *D. antarctica* form long-fronded, thick to very thick-trunked trees (usually 30-80 cm diameter in cultivation and in the wild) which are often 3-10 m high, but can reach 15 m or more in height in both cultivation and in the wild (Page & Bennell, 1986).

Like *D. fibrosa*, the trunks secondarily thicken with a dense web of old root masses, hiding the persistent frond bases, and giving the trunks a tawny grey-brown colouration. Beneath the crowns, old fronds nearly always persist on the plant in large numbers, to form an impressive skirt (Page & Brownsey, 1986). As with *D. fibrosa*, plants are not linked by underground rhizomes, and so grow individually. The fronds of adolescent and mature plants are usually about 200-250 cm long, and the stipes are very short and pale with long (c. 3 cm), pale brown, soft, lax, silky hairs, which usually detach from the plant by their bases extremely easily when lightly pulled. The pinnae, which continue nearly to the base of the frond, are typically broad and quite widely spaced, with a dull upper surface, flat pinnule margins, and a texture which is fairly soft to grasp. In contrast to *D. fibrosa*, fronds on most plants tend to be of a more constant width throughout much of the central part of their outline, with an indistinctive widest point usually about the mid-point, tapering more equally both above and below this. The pinnae of mature fronds are also much more flexible than are those of *D. fibrosa*, and tend to be more perpendicularly arranged. They also curve gradually basally and droop somewhat downward at the tip and either side of the pinna midribs.

D. squarrosa thus differs from the other two species by several characters, but mainly by its slender trunk and large dark-scaled fronds with long, dark stipes, which are shed from the crowns when old, as well as underground rhizome links.

D. fibrosa differs from *D. antarctica* in having markedly smaller fronds on mature specimens, with short, strongly-retained hairs, crisply undulate pinnule margins, and more numerous, narrow, crowded and forward-swept pinnae, which are more rigid and harsh to the grasp.

D. antarctica differs from *D. fibrosa* in having markedly larger fronds (even on small trees only a metre high), with long, weakly-retained hairs, flat pinnule margins, and less numerous, broad and more widely-spaced pinnae, which are more flexible and soft to the grasp.

These differences are based on the morphology of mostly adult plants, and probably apply in much lesser degree to juveniles. Nevertheless, young plants generally increase in size very rapidly, with their fronds reaching nearly adult morphology through their first decade. Even for juveniles of *D. fibrosa* and *D. antarctica* however, the features of pinna breadth and spacing and frond texture may still help to separate them at a relatively young stage.

KEY

- 1a. Stipes long, up to one third of the length of the frond, trunks of trees slender, less than 20 cm diameter, plants usually linked by underground rhizomes *D. squarrosa*
- 1b. Stipes short or 0, trunks of mature and semi-mature specimens broader than 20 cm (usually 30-70 cm), specimens solitary2
- 2a. Fronds of mature and semi-mature plants usually about 100-160 cm long, with a glossy upper surface, and a texture which is very harsh and prickly to grasp, pinnules with undulate margins*D. fibrosa*
- 2b. Fronds of mature and semi-mature plants usually about 200-250 cm long, with a dull upper surface, and a texture which is fairly soft to grasp, pinnules with flat margins*D. antarctica*

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CONCERNING SOME PEST AND CULTURAL PROBLEMS THAT CAN ADVERSELY AFFECT THE GROWTH OF FERNS IN CONSERVATORY, GREENHOUSE OR HOME. (Based on a talk given at the autumn indoor meeting at Kew, 1991)

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It should be said at the outset that ferns are not the most troubled plants with regard to pest and disease problems though there are a number of relatively common "nasties" that will pay them attention, and if allowed to persist can become rather damaging.

Incorrect treatment, cultural conditions or the wrong environment can also be as damaging as pest or disease attack, so a look at this area first.

If incorrect, cultural methods and growing conditions may result in ferns looking visibly unhappy and this can happen surprisingly quickly. A common example is the drying effect on the atmosphere in the home, caused by central heating. However, it will often be found that a fern suffering considerably in one location indoors will recover if relocated to another room, or even moved to another place in the same room. The author only recently needed to remove a cultivar of *Adiantum raddianum* from a southerly aspect room, where it was increasingly unhappy, to a position near the window in a north facing room. Improvement was soon apparent, the plant showing improved vigour and wellbeing.

One should aim to avoid situations that can become too hot, or suffer excessive fluctuations of temperature, though a night time drop in temperature is usually acceptable and, indeed, in many situations, beneficial. Draughts should be avoided, especially for the placing of the more soft and tender items, for this can encourage the prevalence of mites (tarsonemid and broad mites, especially, which cause foliage distortion). Also, avoid a situation where a plant would be in strong sunlight for long periods, especially if directly behind a window, though, equally, a dark and gloomy corner would be ill-advised, especially through the winter months.

Drought is, of course, an anathema to so many of the ferns, so much so that within a few hours a perfectly marvellous plant can be reduced to a shrivelled apology that may take months to recover - if recovery proves possible. On the other hand, damage due to over application of water does not, in general, cause such an immediate problem as drought but, nevertheless, can result in damage to the root system and/or rhizome, etc. With most ferns this is likely to be more prevalent through the autumn and winter months when growth is at its lowest ebb. Again, standing potted ferns (unless of water or wetland habitat) in a saucer or tray which may accumulate up to an inch or more of water is not advisable, for this will cause the compost to become waterlogged and anaerobic, to the detriment of the plant's roots. Incidentally, this is likely to be more of a problem where plastic pots are used. Standing plants on top of a shingle bed in a plant saucer or tray, where water can be added to a level below the pot base, is ideal, for, as it evaporates, the immediate area around the plant is slightly moistened, providing an improved microclimate.

It would seem pertinent to offer a few words of caution concerning the acquisition of plants to add to or build a collection, for, unless care is exercised, it is at this stage that pest and disease problems can be inadvertently introduced.

It is wise to check over all possible acquisitions with care and select visibly healthy plants, divisions, etc. Beware of signs of dessication for this may not only be due to drought but could be the outward sign of root or stock ailment that is best avoided. Inspect foliage and growing points for insect pests, or signs that they have previously

I given the plant attention, for eggs laid and not easily observed will be the next generation waiting to trouble the plants and you!

Control of Pests/Disease

If, on running through your cultural checklist, you have not satisfactorily identified the problem/s then attention should turn to the possibility of the cause being a pest or disease related one.

In thinking about pest and disease problems and controls, it should be stated that many pesticides and fungicides can be phytotoxic, especially to ferns; they may also be toxic to the persons applying them and be damaging to the environment. Sometimes their use is unavoidable, but it is becoming increasingly popular and, indeed, preferable to use physical or biological control measures where available, reserving pesticides as the long stop should all else fail.

As more research effort is channelled toward biological, or what is more correctly termed Integrated Pest Control (where predatory insects, certain fungal and bacterial agents, physical traps, and low toxicity and persistence chemicals are employed in a truly integrated pattern), the armoury is expanding, with some promising results.

Physical traps are also playing an increasingly important role to catch winged pests such as white fly and are used also to monitor the degree of certain infestations. Usually in the form of yellow or blue plastic sheets (some produced and marketed in sheet size 25 x 40 cm) and coated in a long persistence glue, they are hung or located at crop height where they are most effective. No pesticide is used in their manufacture.

Aphids

The attack may be from the fern aphid *Idiopterus nephrolepidis* which is black with white legs, or the green *Myzus persicae*, or possibly others. They congregate on the young fronds and growth points and suck the plant sap, debilitating and distorting the plants and, by their method of feeding, can transmit viruses from plant to plant.

Control can be by washing the aphid colonies off the plant with a tepid water spray from a pump-up sprayer (a few drops of washing-up liquid may be added to help the water to penetrate the aphid colonies). Alternatively, use the biological control agents *Aphidoletes aphidimyza* and/or *Aphidius matricariae*. The former is a predatory midge, the larvae of which live by piercing the aphids and devouring their body contents, while the latter, a small wasp-like creature, lays an egg in the aphid, which hatches and proceeds to devour the body fluids - eventually pupating and emerging from the aphid as an adult - thus continuing the cycle.

Mealy Bugs

Pseudococcus obscurus is probably the commonest species (despite its specific name) found in glasshouses in Britain, but others do occur, including the long tailed mealy bug *Pseudococcus longispinus*.

They tend to form colonies and hide near veins on the foliage and inhabit the growing points of ferns where they feed on the plant sap. Like aphids, scale insects and white fly, mealy bugs excrete a substance called honey-dew which is rich in sugars. This forms a coating on lower foliage around the feeding site/s. This coating is often colonised by a fungus called sooty mould, which looks most unsightly and can be detrimental to plant growth if the coating is heavy and widespread on the plant.

Control of mealy bug (Fig. 1) (all Figs. opp. p. 108) can be effected by the introduction of the lady bird-like *Cryptolaemus montrouzieri* (Fig. 2); both adult and larvae will feed on the mealy bug colonies. Though freely available from suppliers, this predatory insect is somewhat choosy about plants and conditions. However if *Cryptolaemus* likes your

conservatory or glasshouse (not sure if it would work in the home) it will do a great job, though it has to be stated that the older larvae have the appearance of large, rather more fluffy mealy bugs so do not be alarmed if these creatures appear some time after the adults are introduced!

There are also species of mealy bug that live in the compost feeding on the fern roots. These are difficult to get at and a soil drench of a Malathion based insecticide is preferred - use at or slightly less than the manufacturer's recommendation. Malathion can be used to control mealy bug on the upper parts of the plant if predator and physical washing fail.

Sooty mould may be sponged off the plants in the same way as described here for the physical removal of scale insects or, if a heavy coating has developed it should be allowed to dry out completely, causing it to flake and peel, whereupon it can be swilled from the foliage.

Scale Insects

A variety of scale insect species can attack ferns, though the most commonly met with are soft brown scale, *Coccus hesperidum*, and the fern scale or snow scale *Pinnaspis aspidistrae*. The latter appears as tiny white flecks on the fronds, usually scattered over the undersurface and feeding by sucking the plant sap, causing yellowish white marks which, in a heavy infestation, can cause the frond to appear mottled. Both types of scale mentioned can severely debilitate a fern and must be treated.

Ferns with fronds that lend themselves to physical washing - the *Asplenium nidus* group, *Microsorium punctatum* and some members of the *Elaphoglossum* genus, etc., can be washed clean of the pest, using tepid water and a soft sponge. The larger scale species are the most successfully treated in this way. Do not attempt to use the hard cellular sponges for they may cause damage to the frond tissue - change the water in the bowl or bucket frequently. Obviously, some juvenile scale stages will be overlooked but a thorough and careful washing will give very satisfactory results.

Biological control can be attempted, using the small wasp parasite *Metaphycus helvolus*, though warm conditions seem to be necessary for this to be able to work effectively. A microfungus, *Verticillium lecani*, marketed under the proprietary name "Mycotal", has been found to gradually lessen infections, though again warm conditions coupled with a high relative humidity level are essentials for this agent to work. It is, however, ideal for use in a tropical fernery where the preferred relative humidity level of 85% plus can be provided.

White oil, which works mostly by smothering the insects, thereby cutting their access to air, can be effective, though usually two applications are necessary and there is need to give good coverage of the foliage colonised by the insects. Use as recommended by the manufacturer and I would advise not using more than two applications in succession, for the product can be damaging to young fronds, and will cause dark areas to develop on older fronds if used too frequently.

A systemic insecticide is likely to be the most effective treatment and there is a product still available which has dimethoate as the main systemic ingredient. Best advice is to try this on one or two plants initially - watch after a day or so for any sign of toxicity on the foliage. Do not apply spray if the temperature is over 24 C (75 F) or if in bright sunshine. A good rule for most insecticides.

White Fly

Generally, very good control of the glasshouse white fly, *Trialeurodes vaporariorum*, can be effected using the parasitic wasp, *Encarsia formosa*.

As with all biological agents observation is paramount, and early detection of the pest allows introduction of the predators before extensive colonisation of the plants has taken place. *Nephrolepis* spp, in particular, can be the subject of persistent white fly attack. Some of the quick acting, flying insect control products can be used to spot treat, but remember, if biological control is to succeed, indiscriminate or over use of chemical formulations should be avoided, if possible. Also the quick-acting (knockdown) products will often only knockout the adults, being of little use against eggs or scale stages of whitefly.

Red Spider Mite

Tetranychus urticae, the two-spotted red spider mite (Fig. 3) can be troublesome, the problem often exacerbated by an incorrect environment, which usually means too hot and dry. A light misting over of fern foliage, using a hand trigger sprayer or small pump pressurised type, using rainwater or filtered tap water at room temperature, will physically combat spider mite attack and can also be of benefit to the ferns. However, avoid wetting the plants during periods of low temperature or late in the day, especially in winter.

There is a predatory insect, *Phytoseiulus persimilis*, (Fig. 4) which will frequently give more than adequate control. Again, early detection of the pest allows rapid introduction of the predator, so avoiding chronic build up of spider mites. A further aid to assist the predator gain control is to fairly forcefully wash over the foliage (both upper and lower surfaces) and allow to dry before the first introduction. *P. persimilis* can live on the eggs of the red spider mites if adults and young are in only minimal numbers.

Thrips

Various species of thrips are becoming troublesome, including *Thrips tabaci*. Their rasping type of feeding on both the upper and lower surfaces of the fronds of a range of fern species causes a silvery affect, disfiguring the plants, and in numbers they are very debilitating.

A predatory insect, *Amblyseius cucumeris*, can be used for light infestations. It feeds by devouring the first stage of the young thrips as they hatch from the eggs. It will also feed on pollen should thrips be unavailable, but our precious ferns are unable to help here ! "Mycotal" will work well if the same conditions of temperature and humidity prevail as mentioned for the control of scale insects. If drastic action is needed the systemic insecticide mentioned previously may be used to good effect.

Vine Weevil

An increasingly troublesome if sporadic pest (Fig. 5) of some rhizomatous ferns and the clump forming types, especially those liking drier conditions. Adults eat notches out of the foliage and lay eggs at the base of the plant where the resulting grubs will invade the root area, devouring plant tissue below ground level.

A relatively simple treatment, using a beneficial eelworm (Fig. 6) to carry a bacterium into the bodies of the vine weevil larvae, results fairly quickly in their death - whereupon more eelworm are released to carry on the culture.

Procedure for application is to mix the eelworm culture with water and apply this by watering-can to the soil of the plants affected. There is a different eelworm species that is effective against the larvae of the fungus or sciarid fly, *Lycoriella auripila*, and the culture is applied in the same way. The products are marketed by one company as "Nemasys" and "Nemasys H" - the latter being for fungus-fly larvae.

The predators and biological formulations arrive through the postal service and should be dealt with as soon as received. Some of the formulations need to be held at fairly low temperatures if not used quickly.

The different producer companies package them in a variety of ways, many of which are very simple to handle and apply to the plants. The author is given to understand that at least three producer companies will deal with the amateur market:

Natural Pest Control, Watermead, Yapton Road, Barnham, Bognor Regis, West Sussex
 English Woodlands, Hoyle Depot, Graffham, Petworth, West Sussex, GU28 0LR
 'Wye bugs', Wye College, University of London, Wye, nr Ashford, Kent TN25 5AH.

Each company may not handle the same range but will be able to advise as to availability and supplier. It may be found that availability of some predators and other agents through the winter months is variable. Many of the predators are naturally-occurring insects in the British Isles and have to be encouraged into breeding cycles at a time when they would normally be hibernating or otherwise inactive.

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THE GLASLYN BRACKEN CUTTER

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Bracken is a very successful and invasive weed. Although once restricted by broadleaved woodland it has spread rapidly because of woodland clearance. It is still invading marginal agricultural land.

Originally the only practical method of controlling the spread of bracken on hilly land had been by scything, which was an extremely slow and laborious process. The cut bracken was often stored in stacks for later use as bedding for cattle. After the advent of the Agricultural Wages Board in 1921 it became impractical to employ men specifically for bracken cutting as it was far too expensive.

In 1930 Charles H. Williams Ltd. of the Glaslyn Foundry, Porthmadog manufactured a machine for bracken cutting to a patented design of James Pugh, a sheep farmer of Gartheiniog, Aberangell, (see Fig. opp p. 109). The design was a simple one based on the roller principle to be pulled by horse. Carbon-steel knives were attached to three iron discs arranged along a six-foot axle. As the machine was dragged forwards, the knives turned and cut the bracken. It was capable of cutting up to ten acres per day, a considerable improvement on the one acre or so which could be done by scythe. It also worked efficiently on very steep slopes without showing any signs of sideslipping and stones caused no damage. The cutters were also designed so that they could be used singly, in pairs or in threes.

The most reliable method of eradicating bracken was to cut in June, when the fronds had nearly reached full height without unfurling, and then at about six-weekly intervals. This effectively exhausted the food reserves in the underground stem, thereby killing the plant. So successful was the machine that it could almost be said to have made itself redundant. Once the bracken had been cleared it was a relatively simple task with fertilisers to keep the land clear, with a result that the bracken cutter was no longer needed. Production ceased around the beginning of the Second World War because of lack of demand and partly because of increasing demands upon the foundry's time from war work. Judging from the increase of bracken, perhaps it is time to get the remaining machines out of the museums and back onto the hillsides.

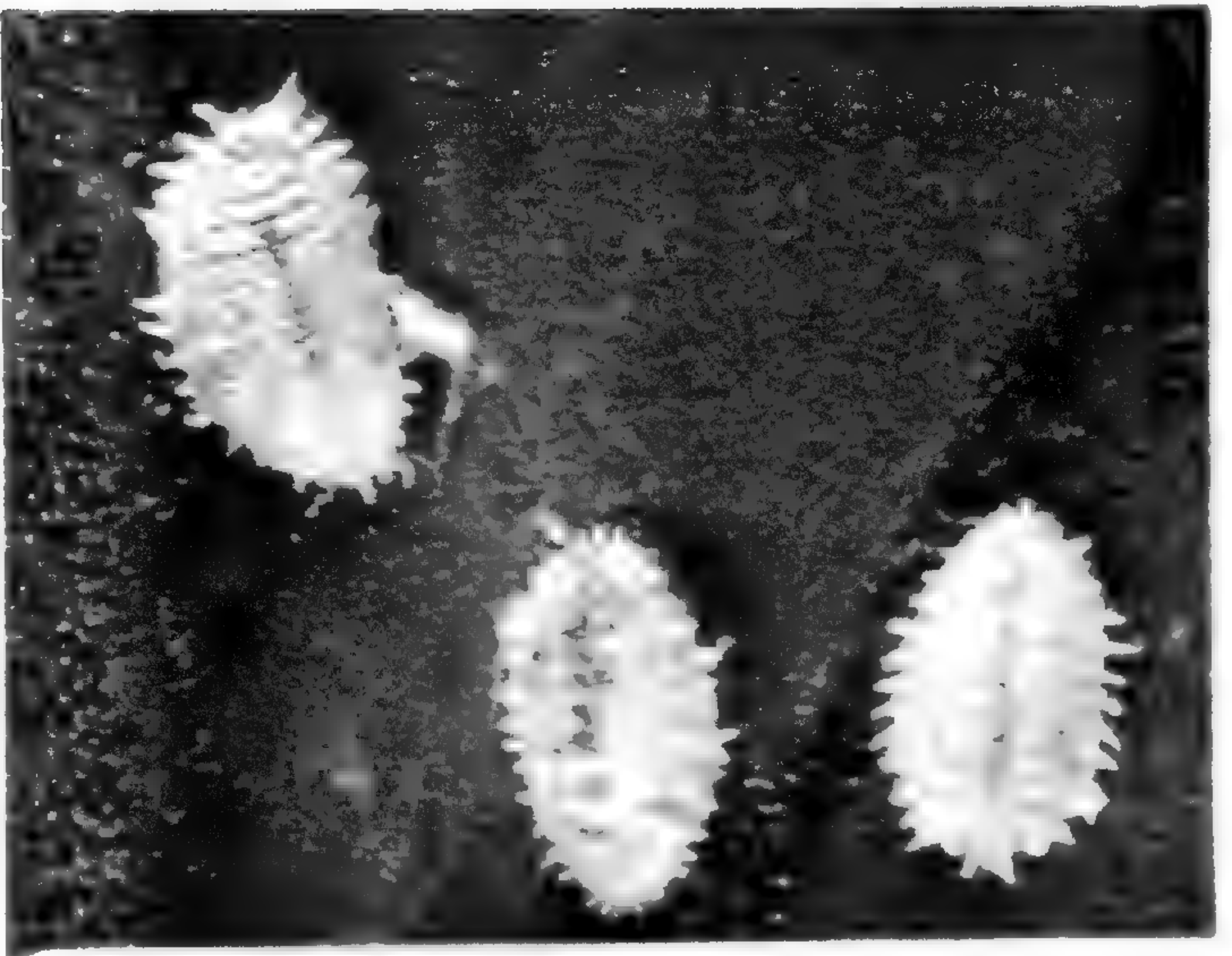


Fig 1 Mealy Bug

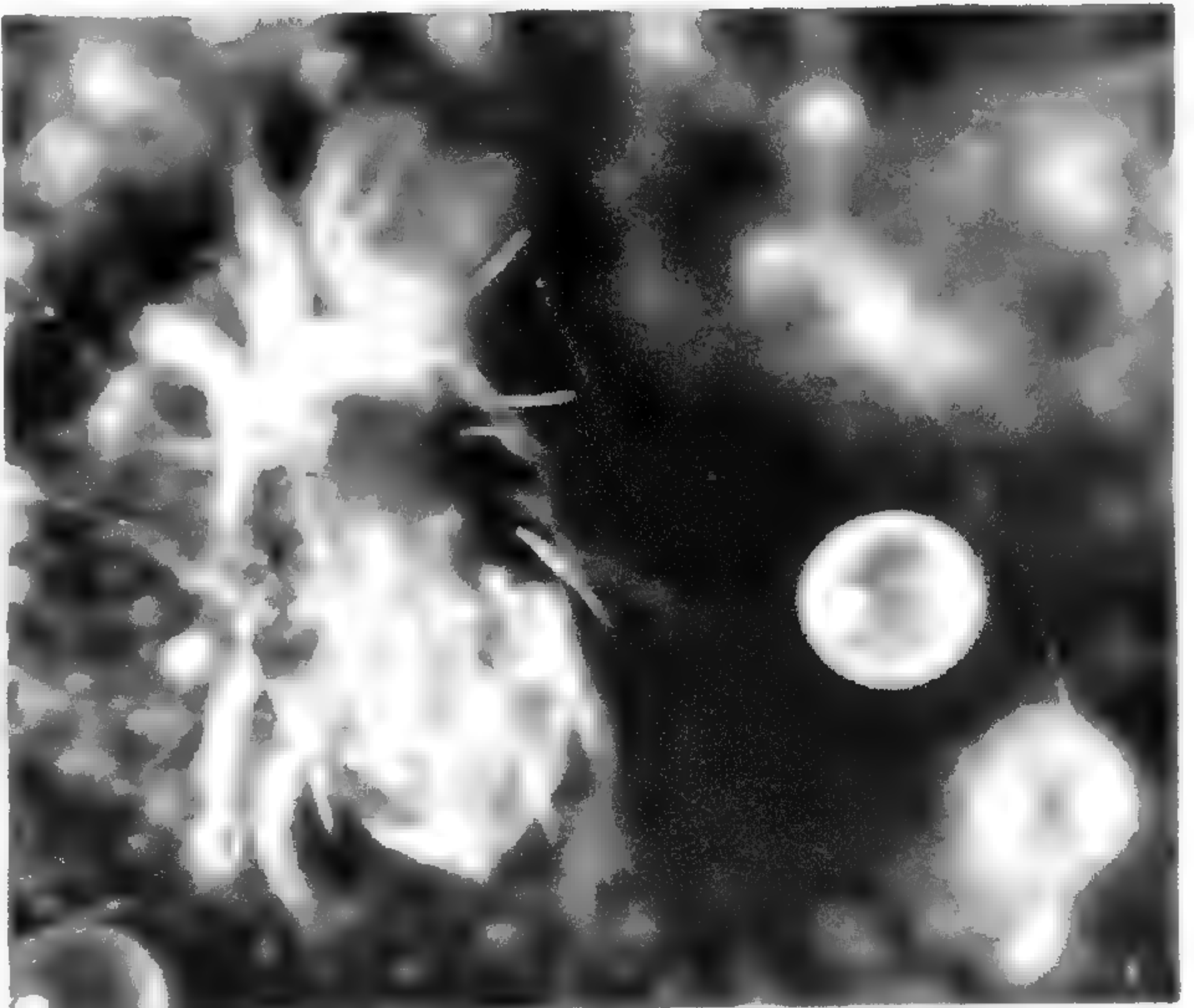


Fig 3 Two spotted Red Spider Mite and eggs

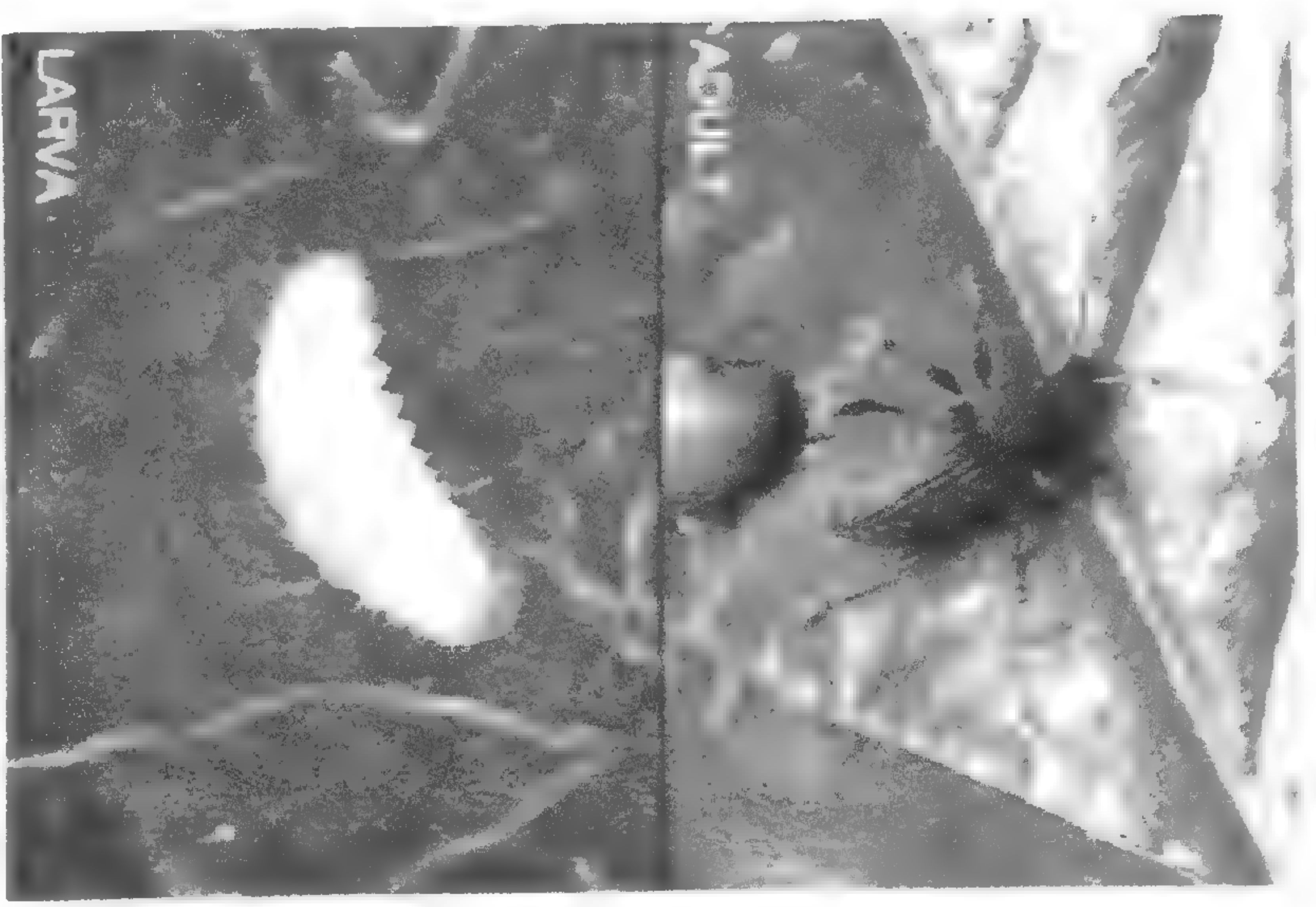


Fig. 5. Vine Weevil

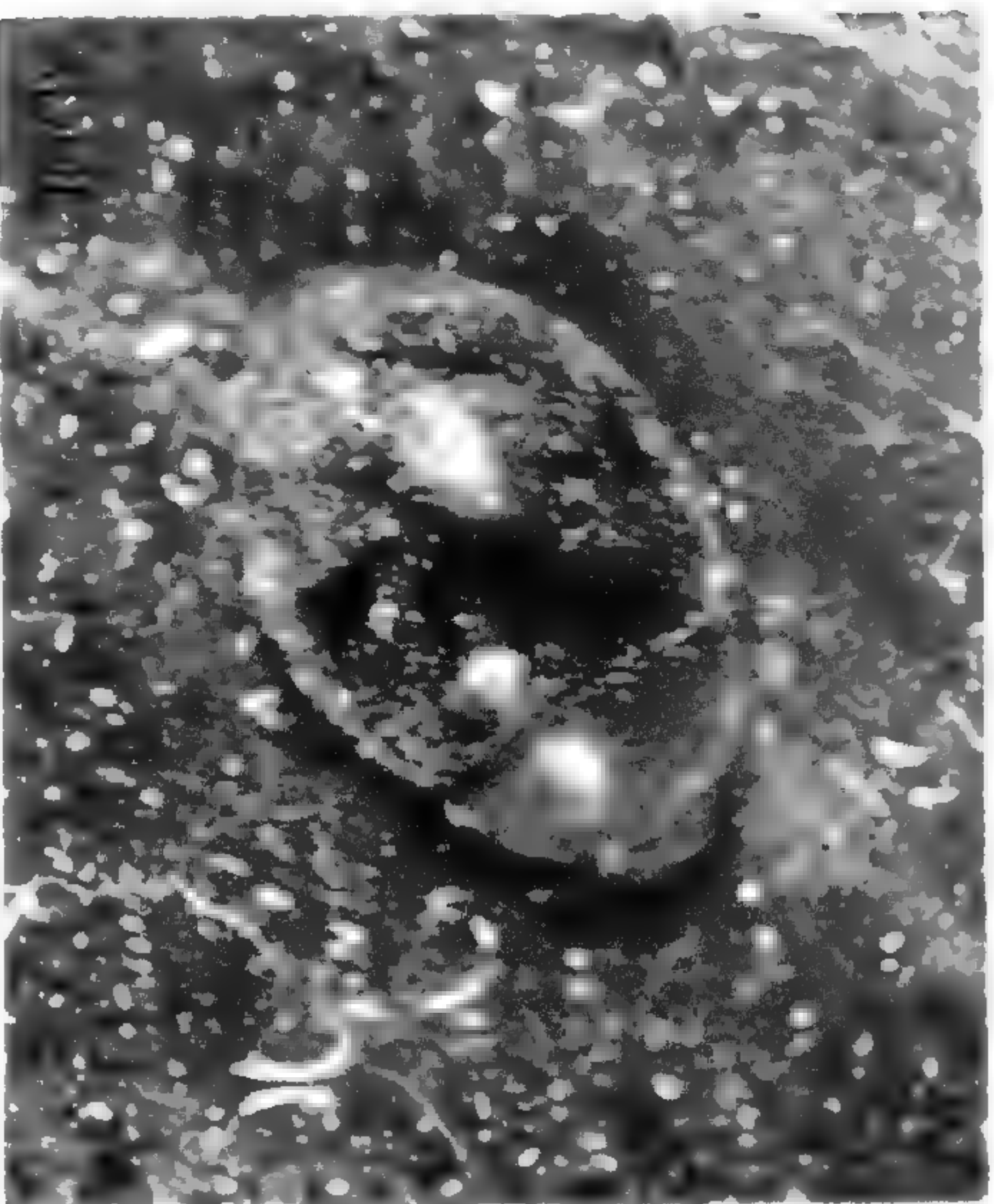


Fig. 2. *Cryptolaemus montrouzieri*
Mealy Bug predator

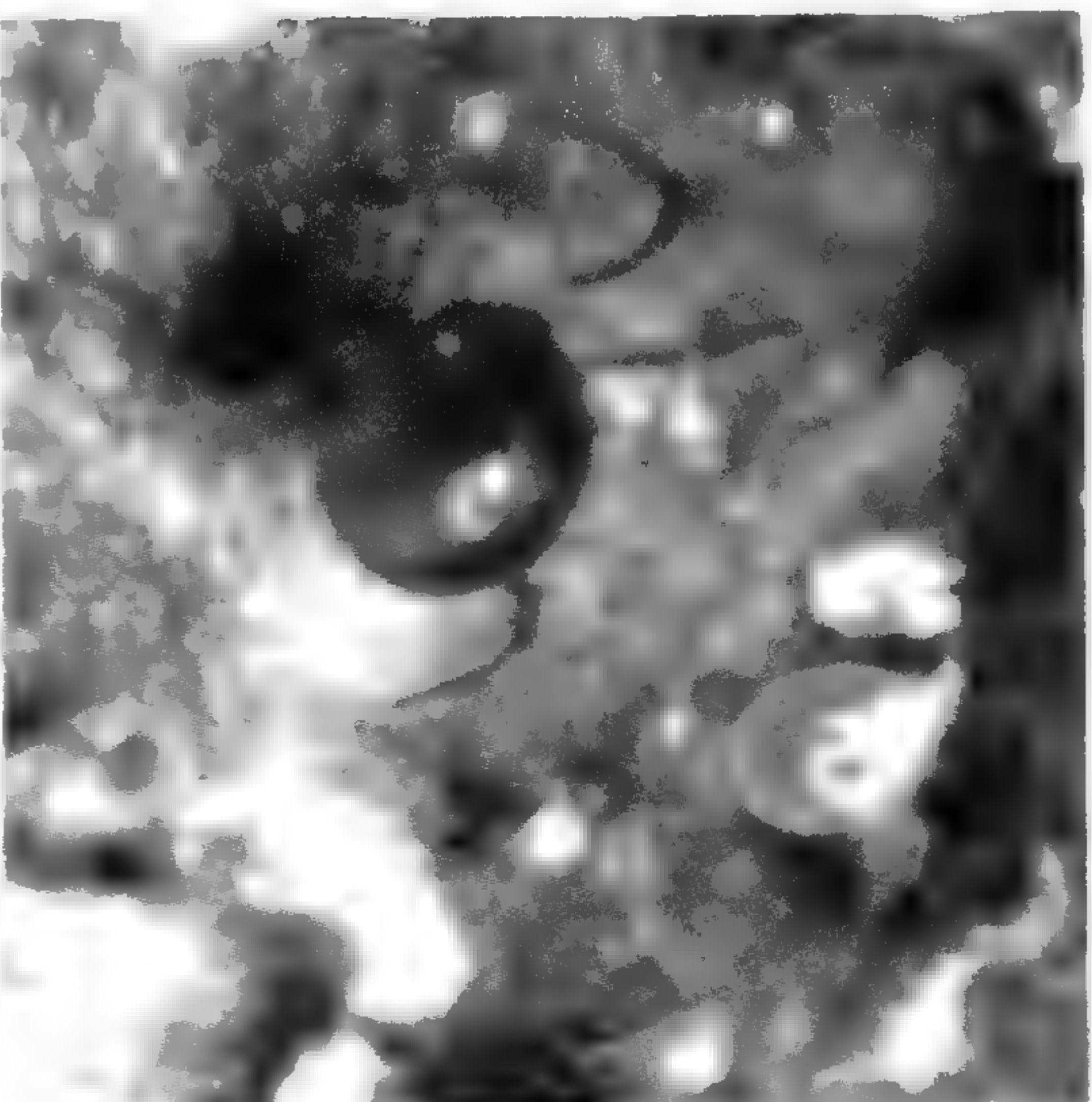


Fig 4. *Phytoseivius persimilis* Predatory mite
(Photographs courtesy of the
Horticultural Research Institute and Applied Horticulture, both of Littlehampton)

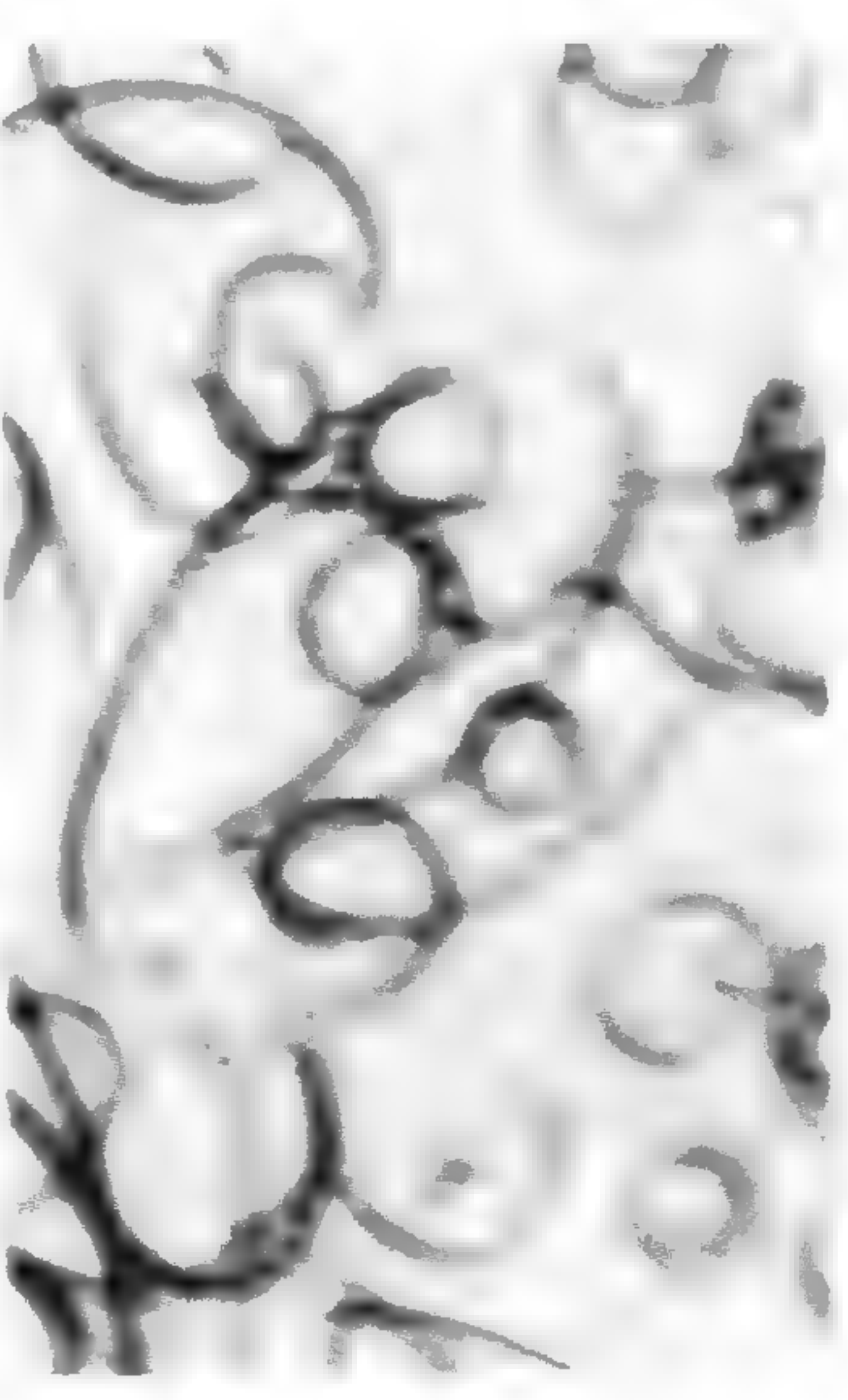
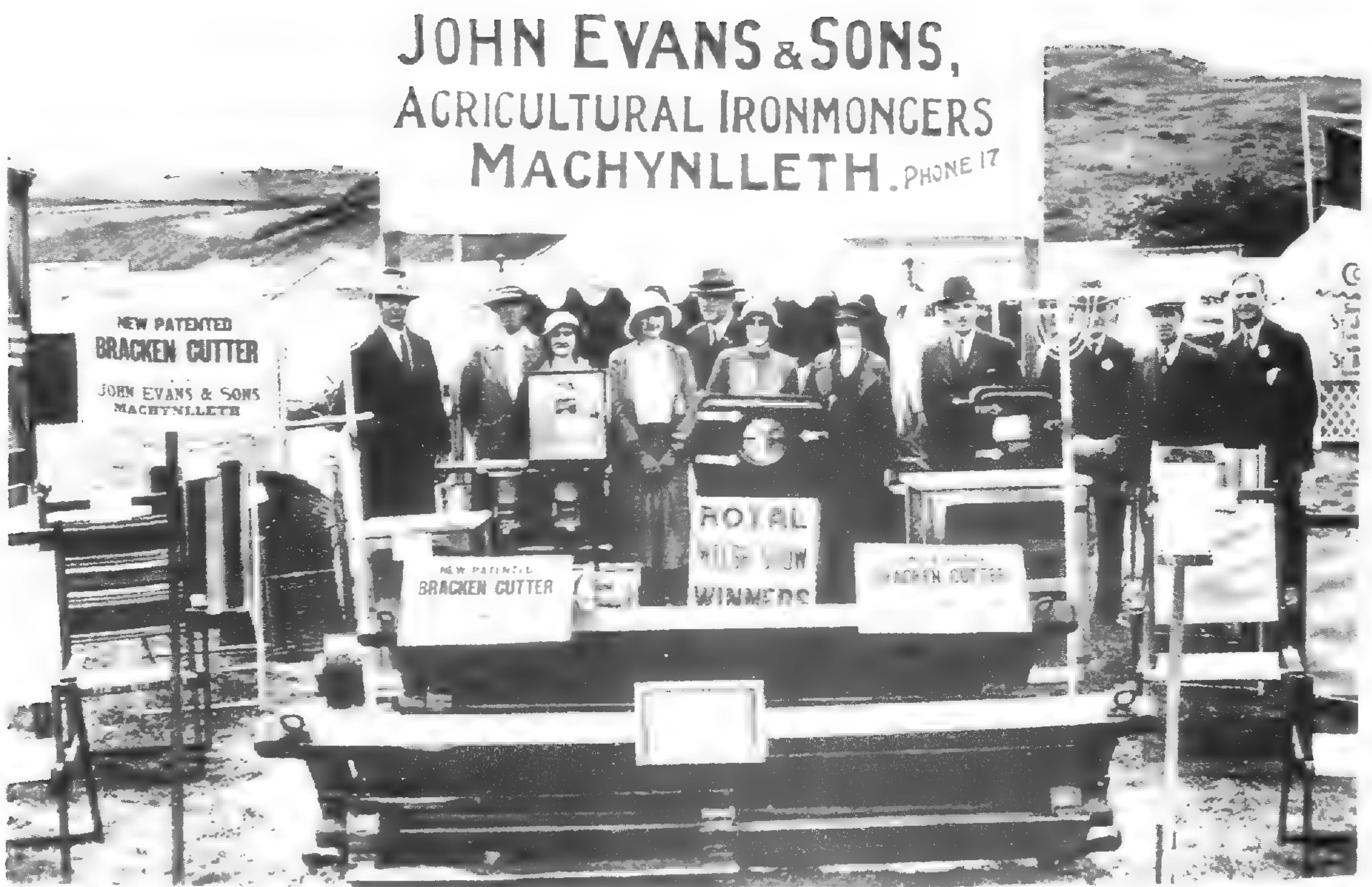


Fig. 6. Beneficial eelworm. Carrier of
bacterium for control of Vine Weevil



Pugh's Patent Bracken Cutter at the Royal Welsh Agricultural Society's Show held at Aberystwyth in 1933 when it was awarded the Society's Silver Medal



"Frizzle head" caused by insect damage on Lady Fern at Otterhead

SHORTER NOTES

Deformed ferns at Otterhead - Somerset/Devon

In 1987 a photographic group organised a walk round Otterhead Lakes which are situated in the Blackdown Hills about ten miles south of Taunton. The county boundary bisects the lower lake. Ferns then as now were the predominant summer ground flora, the area being best known for spring snowdrop displays.

The former estate of about 150 acres was originally known as Wick Farm. In 1841 it was purchased by William Bleadon, a surgeon, who erected a mansion and laid out the grounds to incorporate three lakes. Two of them remain and are used by anglers. Bleadon died in 1864 and the place was acquired by Justice Mellor and then his son-in-law the Hon. Sir W.H. Goschen who died about 1935. The house remained empty. Wessex Water bought the estate in 1939 and on instructions from the local Council demolished the house in 1947. Now Wessex Water with the Somerset Trust for Nature Conservation and the Forestry Commission manage the area.

During the 1987 excursion I observed a large number of fern fronds with what I described as frizzle ends, or distorted tops (see Fig. opp.). At the time I attributed this to the possible use of herbicides, but as I was also then researching the Victorian Fern Craze I did wonder if there was any connection with the ferns at Nettlecombe Court, as it was likely the owners knew each other socially, or their gardeners did. At Nettlecombe the Trevelyans and their gardeners were keen collectors of mutations, and other fern oddities. I was not able to trace any definite link, and until recently forgot the matter.

Following the centenary symposium of the B.P.S., I returned to Otterhead to have another look. It is now rather overgrown, and the lower lake restricted to anglers. Some youths were slashing at the ferns which still predominate and threaten to obliterate both the paths and picnic areas. Bracken is encroaching and, under the trees, there are considerable growths of about seven prolific fern species. Lady Fern predominates and there are sufficient distorted fronds to be significant. From two to ten per plant, with the same feature appearing occasionally on Broad Buckler Fern, but not on Male Fern or any other species.

I suspect an entomologist might know the cause of this occurrence. However, for anyone wanting to see for themselves, it is quite a pleasant walk, preferably on a cool breezy day. There is a car park. Take the Honiton road out of Taunton (B3170) and turn right at a sign marked Otterhead Church. The next turning to 'Royston Water', the name now given to the lower lake, is for anglers only.

PRIMROSE PEACOCK

(I'm sure Primrose is right to attribute this damage to insects. Very often small flies can be seen laying their eggs on fern croziers. The eggs develop into whitegrubs which do the damage. Careful unravelling of a damaged crozier usually reveals the grub. (Ed.))

Ferny Doylies

On visiting "Lilies", "an historic house with 20 rooms of books in a country setting 40 miles from London", I was intrigued to find, on the top floor in a display cabinet on the outer wall of room 15, a display of doylies made out of Lace Bark (*Lagetta linteria*), the spathe of the Silk Cotton plant (*Calotropis procera*), and decorated with ferns from Jamaica, some of which had outlines similar to our Rustyback Fern. For those interested, "Lilies" belongs to Peter Eaton (Booksellers) Ltd; its address is Weedon, a couple of miles north on the A413 out of Aylesbury, Bucks. It is open most days except Sundays. The telephone number is 0296 641393 you can also see the first T.V. tube.

MICHAEL G. SEARLE

COLOUR IN HARDY FERNS

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The title may raise a few eyebrows, an article praising ferns for their various shades of green perhaps? No, I mean COLOUR!

It is true that there are many shades of green in ferns, from the deep glossy green of *Cyrtomium falcatum*, to the most pastel of greens as seen in *Adiantum pedatum*, and, in between, every other shade of green imaginable.

To my mind, colour in ferns falls into two categories, those with colour in the frond that fades as the frond matures, and those whose colour persists throughout the life of the frond. British ferns are not noted for their colour but can perhaps compensate by their tendency to produce varieties!

I would suggest that the exception is *Dryopteris affinis* and its subspecies and varieties. True, the colour is somewhat ephemeral, but the sight of its yellow-green fronds adds a splash of gold to the fern border, especially if it is planted where the sun can catch it and if several plants are grown together to make a feature. As the season progresses, the fronds develop a shiny mid-green, with the hint of yellow, as if to remind you of its youthful glory in the spring.

Athyrium filix-femina is usually seen as a totally green plant but red-stemmed forms are often encountered. Casual observation suggests that the red-stemmed forms hold their fronds more erect and tend to be more brittle. I have also noticed that the red form tends to produce its fronds slightly earlier in the season. Red-stemmed varieties are quite common and, although I am not a lover of the Lady Fern and its varieties, if I must profess a preference, it would be for the red-stemmed forms.

Interestingly, while visiting Wicken Fen during October 1990, I noticed a red-stemmed form of *Thelypteris palustris*. The stipe and rachis were red and the red flush also ran into the base of the pinnae. I found it quite distinct and spores from it were included in the 1991 Spore Exchange list. It might be worth selecting good colour forms from the progeny.

Osmunda regalis has its forms '*Purpurescens*' and '*Gracilis*' which produce purple fronds in the spring, but both become dark green in time, with the colour persisting only in the stipe and rachis.

However, if we want to add greater colour interest to the fern border, we must turn our attention to foreign hardy ferns.

Adiantum pedatum var. *japonicum* produces in the spring the most heavenly pink-tinted fronds which fade to green as the fronds mature.

Arachnioides simplicior, has wonderful bottle-green fronds with a dash of yellow on each side of the mid-rib. (syn *A. aristata* '*Variegata*'? Ed.)

Athyrium niponicum var. *pictum* has steel-blue fronds with burgundy-coloured veins, and the pinnae splashed with silver at the base. Select carefully to ensure a good colour form.

Athyrium otophorum, in the spring, has yellow fronds with red stipes and rachides, the fronds turning green as they mature but the red stems persisting.

Athyrium vidalii, has fronds which emerge purple-black in the spring and slowly turn dark-green as they mature.

Blechnum penna-marina, in most forms, is a rich mixture of green-red fronds in the spring with purple fertile fronds displayed proudly during the summer. Most blechnums

boast some colour; it's a pity that our own *Blechnum spicant* does not have the same ambitions!

Dryopteris erythrosora and its forms. The fronds emerge a rich-red colour, and the fertile ones, in some forms, later display red sori. I cannot imagine anyone not wanting this fern in their collection.

Dryopteris wallichiana is a very variable species, apparently, if the experts are to be believed. I know it as a fern with bronze-yellow fronds sporting stipes and rachides clothed in chocolate-brown scales.

Lunathyrium japonicum - I list this because the one I have is very colourful, not unlike *Athyrium niponicum* var. *pictum*. However, I stand ready to be corrected on this one.

Onoclea sensibilis, apart from the usual green form, has a pink version which I thought attractive until I was shown a red form. Deeper in colour and larger in size, it has totally seduced me from the pink. Tends to be invasive. I prefer to grow it in a large pot but it does not travel well and is easily damaged.

Variegation

Variegation has never featured regularly in hardy ferns; true, there are some very good examples amongst the indoor ferns but I can only think of one hardy form worthy of mention. *Asplenium scolopendrium* 'Golden Queen', of which I know several good plantings. However, it has the annoying habit of turning green if I manage to acquire a piece, which I have on several occasions.

I have heard of phantom forms of variegation in other species from time to time, but they never appear stable in cultivation.

I do not pretend that this list is exhaustive and I look forward to other members adding to it.

BOOK REVIEW

THE ILLUSTRATED FIELD GUIDE TO FERNS AND ALLIED PLANTS OF THE BRITISH ISLES by Clive Jermy and Josephine Camus and illustrated by Peter Edwards, 1991. Natural History Museum Publications, London. pp. xiv, 194, numerous illustrations, probably over 200. 148 x 210 mm. Price £7.95.

This new field guide will be warmly welcomed by the large number of field botanists with an interest in the British Ferns. It is concisely laid out and contains all the basic information one would expect, but, above all, it is thoroughly up-to-date.

Introductory matter includes notes on how to use the book, the fern life cycle, a glossary and a dichotomous key. Further, keys are included throughout the book at the beginning of each genus.

The main systematic section covers all known British pteridophyte species. Coverage of each includes diagnostic characters, habit, habitat, distribution and conservation status, together with useful notes for comparison with closely related taxa. All known hybrids are listed but they are not illustrated or described.

This is a very well organised work which covers the key points of each fern. I disagree with occasional statements, e.g. I don't think most cultivars of *Asplenium scolopendrium* are sterile, also, are there really a few sites in NW Britain for *Dryopteris cristata*? More importantly, it should be noted that the figures of the two non-native species of *Blechnum* on p. 183 have been transposed.

MARTIN H. RICKARD

FERNS IN THE HOME (Based on a talk given at the autumn indoor meeting at Kew, 1991)

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Growing ferns in the home is not easy as it demands skill, patience and a good measure of dedication. Some knowledge or interest in their natural habitat will provide useful guidelines to their successful cultivation. It is far more difficult to produce the right conditions for ferns to grow well than for many other popular pot-plant subjects. For example, a Swiss cheese plant, *Monstrosa deliciosa*, or a rubber plant, *Ficus robusta*, can survive the gloomiest of corners on a minimal amount of attention. Not so the ferns. They require regular attention and some consideration if they are to flourish in the home. In other words, they provide a challenge and for those who are prepared to meet that challenge, ferns will prove to be a very rewarding and decorative subject for the house.

When we consider pot plants for interior decoration, we situate them to our liking and, although many foliage plants are fairly obliging in this respect, ferns are not. We have to find a situation to suit *them* rather than us. So, even if our large *Woodwardia radicans* would be a magnificent feature in that corner behind the television, the *Woodwardia* will think otherwise. The dappled shade of a temperate forest is one thing, the dusty dry corner of a British living room in January is something else. If we are to meet this challenge, there are six conditions that need to be considered: temperature, light, humidity, watering, feeding and potting on. Considering that ferns have adapted to habitats as diverse as from the deep shade of a rain-forest floor to the bright sunlight of the same forest's canopy; and from the rock fissures and screes of an inhospitable mountain to the moist shady protection of a temperate wood; and even the contrasting conditions of heat and cold on desert cliffs and in ravines, we should be able to find the right room or windowsill for the ferns we have acquired. Knowing the habitat of a particular species will guide us to simulate the conditions it requires in the home. It is this 'fine tuning' which provides the challenge.

Light

All ferns respond to good light without direct sunlight. They do not require gloomy conditions. A north-west or east facing window is a valuable asset for fern growing. A south-facing window is fine as long as the plants are not in direct sunlight for the major part of the day. In this situation, somewhere adjacent to the window is better than on the windowsill itself. Some ferns do require direct sunlight: the staghorn ferns, *Platyserium* species, are good examples. They are ferns of the forest canopy where they have adapted to direct sunlight and are able to survive long periods of drought. The best place for them is hanging in a south-facing window but, better still, a greenhouse or conservatory. Finding the right place in relation to light for the majority of ferns is not usually very difficult or critical.

Temperature

Surprisingly, most of the 'exotic' ferns used as pot-plants will tolerate quite low temperatures. They prefer to be warm rather than hot and respond best to a fairly stable temperature regime. Anything between 12-18°C (54-64°F) is suitable. If plants are kept on the windowsill, avoid trapping them between the glass and the curtains at night during the winter, where they will become chilled. Many of the 'exotic' ferns will tolerate short periods at temperatures down to 7°C (44°F) without coming to much harm.

Humidity

This has a direct correlation with temperature and is much more important and difficult to get right. Humidity, the amount of moisture in the air, is measured by a hygrometer. This consists of two thermometers side by side: one records the normal room temperature;

the other has its measuring 'bulb' surrounded by wet muslin. This depresses the temperature recorded by the 'wet bulb' and the difference between the two thermometers shows the room's 'relative humidity'. The relative humidity (or RH) of a centrally heated living room is usually about 48%. Compare this with the RH of a warm greenhouse with a soil floor which is usually about 70%. The greenhouse will have a far more buoyant atmosphere for plants generally, and ferns in particular. Obviously, we cannot arrange for damp conditions in our homes but we can assist our ferns by providing a moist microclimate around them. This is easily done by placing the ferns on saucers or trays containing sand or gravel which is kept moist. The evaporation of moisture amongst and around the ferns will help reduce any stress they might experience due to a dry atmosphere.

Watering

Watering is a skill that has to be learned. It is the one major stumbling block for indoor gardeners and it is where the vast majority of the gardening public make their mistakes. Flowering plants, which have an advanced plumbing system, can tolerate long frequent periods without water and will quickly revive after a good soaking. Ferns, by virtue of their primitive 'rigid' plumbing system, will not tolerate long periods in dry conditions. They show their disapproval by losing their fronds, followed quickly by losing their will to live. This is where the skill, patience and dedication is required. I have no qualms about using hard tap water although soft or rain water is preferable. The best routine is to check the ferns for watering at least twice a week. The drier the atmosphere, the greater the plants' demand for water and the greater the evaporation of water from the compost. The question most often asked is 'how often should I water it?', but in fact, the question should be 'how often should I check it?'. The first question is easily answered: if the plant is dry, water it, if it is moist, don't! However, there are indicators we can observe. Modern peat-based potting compost changes colour as it dries out, from dark brown when it is wet, to light brown when it is dry. It also shrinks away from the side of the pot as it dries. Any shrinkage suggests excessive drying and is a condition that should be avoided. Once a peat-based compost dries out it is extremely difficult to re-wet. Rely on your index finger. Rub the surface of the compost. If your finger is damp, the plant is fine; if your finger remains dry, the plant needs water.

Feeding

Ferns are not gross feeders but, like all plants confined to a pot, they require nitrogen, phosphate and potash plus all the other macro- and micro-nutrients. The golden rule is 'little and often'. Be guided by the manufacturers' instructions but apply at half-strength about once a week in the growing season and once a month in winter. It is helpful to have one particular day of the week or month when it is always done. Never apply feed to a dry soil. Any proprietary plant food is suitable such as Compure, Maxicrop, Baby Bio, Phostrogen, etc.

Compost

Most pot plants produced today are grown in peat-based composts and any subsequent potting should be done in a peat-based compost. I have found that for ferns it is beneficial to add about one quarter by volume of Perlite to three quarters of compost. This improves the drainage and aerates the compost. It also assists the shaking down of compost when repotting. The feed provided in a proprietary compost only lasts about eight to ten weeks unless a slow release form is incorporated. Nitrates are easily leached out of the compost each time a plant is watered so, after ten weeks, regular feeding should be undertaken.

Repotting

Eventually all plants become potbound: the roots completely fill the pot and, very often, the first indication of this is a mass of roots growing through the drainage holes. The

condition of the root-ball is easily checked by tapping out the contents of the pot. Before attempting this, always ensure that the roots are well watered. It makes it easier to ease the root-ball from the pot. This is particularly applicable to plants grown in clay pots. If you decide that the plant will benefit from being potted on, choose a pot about two sizes up from the old pot, for example, from a 5" up to a 7" pot. This ensures a comfortable amount of room and compost for the plant to explore. However, never be tempted to over-pot by placing a plant into a pot several sizes too large. Make sure the rootball is thoroughly watered before repotting and afterwards water again.

Containers

I use plastic pots for the vast majority of my ferns as they prevent the compost from drying out too quickly. Clay pots can be used but extra care with watering is required. Many ferns are very suitable candidates for hanging baskets. Most of them, such as *Nephrolepis*, *Platyserium*, *Davallia* and *Phlebodium* are epiphytic and prefer high-light conditions and good drainage. Chipped bark incorporated into the compost will assist with this. Wire baskets with coir fibre liners or moss, and plastic hanging pots can be used. Remember, though, that ferns suspended in mid-air will dry out more quickly, so they will need closer attention.

Maidenhair ferns

These are worth a special mention. They are the one group of ferns that have a wide appeal to the general public. If you attempt to grow maidenhair ferns for more than one season without some form of seasonal attention, the result is an untidy mix of new, old and dead fronds. This is easily avoided if, during January and February, all the fronds are cut down to soil level. If the plant is pot-bound, pot on as described earlier. If it is a plant pot-bound in a 6" or larger pot, divide into two and repot into the same size or slightly smaller pots with fresh compost. The result is a spring flush of new fronds that will look good throughout the new season. If you keep a close check on the watering you will have two large ferns instead of one.

List of Plants available from Supermarkets and Garden Centres

Most of the following species and varieties feature regularly on pot-plant sale displays, but some of the others are scarce.

Adiantum hispidulum, rosy maidenhair, and *A. pubescens*, a very similar species, are seen frequently.

Adiantum raddianum (syn. *A. cuneatum*) is the common maidenhair of the pot-plant trade. It has produced numerous varieties amongst which 'Fluffy Ruffles', 'Fragrantissimum', 'Fritz Luth', 'Micropinnulum' and 'Weigandii' can be found, most usually un-named.

Asplenium bulbiferum, hen and chicken fern, which has distinct 'bulbils' on its bi- or tri-pinnate fronds, is hardly ever found in commerce but is a very popular 'amateur' fern which will often appear at private plant sales.

Asplenium nidus, the bird's nest fern, has simple entire fronds held nest-like in a rosette. The cultivars 'Angustatum' and 'Fimbriatum' can now be found. The latter appears to be sterile and must be propagated by division only.

Blechnum gibbum is an erect fern with pinnate fronds which are pink when young and is valued for taking on the appearance of a miniature tree fern with a stem up to 60 cm (2 feet) high. It is difficult to keep in good condition beyond five years. *B. occidentale* is well worth seeking. It has handsome pinnate fronds, mahogany-red when young. It has a creeping rhizome, so tends to wander out of its pot, and dislikes over-watering. They both prefer acid conditions.

Cyathea dealbata, the silver tree fern and national emblem of New Zealand, is occasionally imported from Holland and may turn up in larger garden centres.

Cyrtomium falcatum, Japanese holly fern, is popular as both a hardy garden fern and as a pot plant. Its hard shiny glossy green fronds prevent it suffering from all but the most outrageous neglect. *C. fortunei* is also common.

Dicksonia antarctica and *D. fibrosa*, are occasionally found with *Cyathea dealbata*, but beware of incorrect labelling! They generally prefer acid conditions.

Davallia solida var. *fejeensis* and other hare's-foot ferns may be available. These make excellent basket ferns and will stand drier conditions.

Didymochlaena truncatula is often overlooked in the plant sales area due to its unexciting appearance. However, in maturity it is a large handsome fern with bi-pinnate fronds with glossy dark-green pinnules, often rosy-red when young. Keep this fern well watered and fed, otherwise it drops its pinnae and looks terrible.

Doryopteris pedata, is a small fern with very appealing attractively-shaped fronds that improve with age. The variety *palmata* is larger with deeply-cut fronds. *Hemionitis arifolia* is a related fern which has 'plantlets' on its entire fronds and dislikes over-potting.

Microlepia speluncae, the so-called carrot fern, has soft hairy tripinnate light-green fronds and a wandering rootstock. Parks departments use this one.

Nephrolepis exaltata, the Boston fern, is so well-known that even the general public recognise it as a fern. Several fancy cultivars are available in addition to the more normal forms. 'Linda' has very congested and dissected fronds. 'Duffii', a cultivar of *N. cordifolia*, with rounded button-like pinnae, is well worth seeking.

Pellaea rotundifolia, the button fern, is a very common amenable small rosette fern enjoying an acid compost and good light. *P. falcata*, a larger colonising relative, is more difficult to keep in good condition.

Phlebodium aureum and its cultivars, with attractive glaucous fronds, make excellent basket ferns, eventually growing to several feet in height but, unfortunately, are not commonly available. They withstand drier conditions and enjoy being potbound.

Platycerium bifurcatum, the stagshorn fern, always causes comment from the uninitiated. It prefers a very open free-draining soil-less compost with added chipped bark and enjoys being suspended in a pot or basket or grown wired onto cork bark. Give it plenty of sunlight, watering once a fortnight in summer, once a month in winter. The much larger *P. grande* has been found with diligent searching.

Polystichum tsus-simense, better known to British growers as a foreign hardy fern, is quite often offered as a pot plant. Perhaps someone knows why this *Polystichum* and no other is used in this way.

Pteris cretica, the Cretan brake, is the most ubiquitous of ferns, appearing at your local green grocer's by the trayful, usually in several different varieties. The fronds are strongly dimorphic with the fertile frond narrower and held stiffly erect. The attractive variegated forms need more light as they lose their colour in too much shade. The addition of lime to the compost is beneficial. Occasionally other species, including *P. argyraea* and *P. tremula* can be found.

Rumohra adiantiformis, is the floristry fern, but despite its popularity as cut fronds, imported from Florida in their thousands, I have never seen it for sale in a garden centre.

Stenochlaena palustris, the climbing swamp fern, is vigorous with wide-ranging rhizomes that climb, given the opportunity. It remains barren unless these rhizomes are able to climb into high light conditions. It is very attractive with bronze-tipped young fronds

and requires a higher minimum winter temperature than most of the other ferns mentioned.

The following rarities have sometimes been found in aquarist suppliers:-

Bolbitis species reportedly crop up but found by others not me.

Ceratopteris thalictroides, water fern, has lettuce-green fronds with bulbils often produced. The fertile fronds are strongly dimorphic, being very thin. Often found planted or floating in tropical aquaria.

Isoetes flaccida, found just once in an aquarist shop in the Midlands, but it is well worth checking carefully through tropical aquaria suppliers for pteridophytes.

Trichomanes speciosum is often used but is usually supplied as cut fronds pushed into rock wool filled containers. However, rooted portions have been found.

Selaginellas. These really are the cinderellas of the pteridophyte world and deserve a whole chapter to themselves. Those commonly available are *Selaginella emelliana*, *S. kraussiana* which has both green and gold forms, *S. martensii*, and *S. helvetica*, but many more species deserve to be more widely grown.

I am sure that this list is not exhaustive and would be pleased to receive feed-back of what is available in your area. If you find your local outlet has a poor selection, then why not turn your attention to the Society's Spore and Plant Exchange Schemes where you will find a wide selection of species to challenge you. Fibrex Nurseries and Mrs Jean Marston also offer a much extended range of non-hardy ferns by mail order. 'The Plant Finder' will also supply the addresses of further nurseries which offer a few exotics including tree ferns.

Recommended Books

Fern Growers Manual, B J Hoshizaki. KNOPH, 1975

Encyclopaedia of Ferns, David Jones. BMNH, 1987

Maidenhair Ferns in Cultivation, Chris Goudey. LOTHIAN, 1985

The Plant Finder, Chris Philip (Hardy Plant Society). MPC, 1992

EQUISETUM FUNGICIDES?

MICHAEL G. SEARLE, Oak Lodge, 108 Cumnor Hill, Oxford, OX2 9HY

In continuance of this query, The British Herbal Pharmacopoeia and elsewhere, provide the following information, regarding the constituents of *Equisetum arvense* L., as aconitic acid, saponins, nicotine, palustrine palustrinine, flavonoids, calcium, sodium, iron, manganese, potassium, sulphur, magnesium, tannin, a complex of alkaloids and a bitter glucoside. The flavonoids are quoted as being luteolin, isoquercetin and equsetrin. However, different authorities seem to have varying ideas as to these constituents and also the possible toxicity of what is a well-known medicine for the treatment of urinary stones, cystitis and prostatitis. It is suggested by Michael Hallowell that thiaminase in Horse Tail causes a deficiency of vitamin B1, permanently damaging the liver. Of course, the amount of any chemical contained in any one plant of equisetum will depend on its growing conditions, as well as the make up of the soil in which it is growing, so that the same species growing under different circumstances could well present a different set of constituents, particularly in respect to quantity. There appears to be varying ideas about the numbers of different species of Equisetum, one source quoting 25 known species, 7 of which grow in Britain, and another quoting 16, with 11 in this country

To underline the variation in constituents, *E. hyemale* is reported to be the best cleaner as it deposits the most silica on its outer skin. In passing, it is noted that a tincture of Horse Tail, used daily, is recommended for perspiring feet.

To return to the main question, a number of writers refer to the antiseptic and disinfective properties of our plant and it is to be noted that sulphur appears in the list of constituents, but, I suspect, in amounts decernable only to an analytical chemist.

Seeing that speaking to plants is no longer considered eccentric, is it possible that plants react to the placebo effect??

BOOK REVIEWS

Over the last twelve months the Society has published the following three *Special Publications* as part of its centenary celebrations.

THE CULTIVATION AND PROPAGATION OF BRITISH FERNS By J. W. Dyce, *British Pteridological Society Special Publication, number 3, 1991. Pp. iv, 38, several black and white photographs and figures. Price £3.00 + post & package.*

In this book Jimmy Dyce covers all the major topics of interest to the fern grower. At long last we have here the very book we need in reply to the question 'Is there a simple, inexpensive book for beginners on how to grow ferns?' In his usual very readable style, Jimmy works through the fern life cycle, variation in ferns, the cultivation of ferns and their propagation. At the end he gives a series of very useful appendices providing basic facts for the fern grower.

The bad news is, this fact-packed volume is already nearly out-of-print. However, I am delighted to hear a second, expanded, edition is proposed!

THE HISTORY OF BRITISH PTERIDOLOGY 1891 - 1991 edited by J.M. Camus, *British Pteridological Society Special Publication, number 4, 1991. Pp. 127, 26 black and white photographs. Price £5 + post & package.*

This fascinating volume is a compendium of 13 articles on various aspects of pteridology and the BPS over the last 100 years. The contributions are either personal recollections, eg. by Prof. Holttum and Christopher Fraser-Jenkins, or reviews, eg. by Barry Thomas and Peter Barnes, or studies of the Society over the last 100 years, eg. by Jimmy Dyce, Matt Busby and Nigel Hall. To cap it all, there are two very clever poems, written by Bridget Graham and Ray Smith. The whole volume makes very absorbing reading. A bargain at £5!

THE BRITISH PTERIDOLOGICAL SOCIETY ABSTRACTS AND REPORTS AND PAPERS READ AT MEETINGS 1894 - 1905, *British Pteridological Society Special Publication, number 5, 1991. Pp. 233 approx., several black and white photographs. Price £7.50 + post & package.*

The reprinting of these papers was long overdue. Original copies are very rare and it is only right that our Society's earliest publications should be available to the wider membership. The information in this collection is almost exclusively horticultural with contributions from many of the founders of our Society, especially C.T. Druery, W.H. Phillips, and Dr. F.W. Stansfield. Much of the information has not been repeated since and I am sure it will fascinate today's growers. In effect, these papers are the forerunner of the *British Fern Gazette* which started publication in 1909.

All three of these publications are excellent value and surely essential reading for all BPS members! All are available from BPS Booksales.

MARTIN H RICKARD

MORE ADVENTURES WITH SPORES

PETER H. HAINSWORTH, *Station House, Achnashellach, Strathcarron, Ross-shire, IV54 8YR*

Three years ago I wrote of my first adventures in raising ferns from spores (*Pteridologist* 1989). It is just possible that some members may be interested in my further adventures. There must be others in a like position to myself, isolated from other members, except for a major excursion once a year, and I know some are asking the same questions.

Being of an experimental nature, I am never satisfied. The bare essentials of fern raising appear in several books, the most extensive perhaps appearing in David Jones's *Encyclopaedia of Ferns*. But the finer points of fern physiology and development, as far as they are known, are, I expect, still tucked away in academic archives and nurserymen's heads. Anyone trying to write a book on the subject would be into an enormous amount of work digging out the information for a very limited readership and, therefore, profit. What Government research station is going to spend time on a subject of negligible economic importance? It could possibly be a labour of love for a dedicated fern enthusiast (don't look at me) with lots of spare time and, preferably, a degree in botany (and access to Martin Rickard's library!).

Starting with basics, the first details I would like to know are the required conditions for spore germination. Obviously, light, warmth, moisture and nourishment are essential for subsequent growth. Air we take for granted, but how much of each and at what stages for each species for optimum growth? Moderate light is needed for most ferns, if not to initiate direct germination, certainly for growth. High levels of direct sunlight lead to pale green prothalli and fronds, if not actual bleaching and withering.

A temperature of between 55-65°F seems to be the minimum for germination for most spores and if they are not showing after four weeks I begin to have doubts about their viability, though a few take six weeks. Temperatures above this give faster growth for most things but at 90°F, or over, prothalli go brown at the centre and edges and slowly expire. For me, this usually means the unexpected first sunny day in May and I am 50 miles away! Direct sun in spring or summer is usually lethal, though not always immediately apparent, even half-an-hour from a shaft of sunlight from an unexpected direction. My only safe place in summer is under the green-house staging, even though the average light there may be less than optimum.

Experiments with the chilling of newly sown spores, a necessary procedure for many seeds, have proved inconclusive. Sometimes the chilled spores have come up immediately, the unchilled ones from the same batch not at all. On other occasions both have taken the same time to germinate. The species tried were mostly alpine or cold tolerant - *Asplenium viride*, *A. adiantum-nigrum*, and *A. ruta-muraria*, also *Polystichum lonchitis*, *P. vestitum*, *P. makinoi* and *P. polyblepharum*. Obviously, something else is at work here, possibly moisture levels again, and as no-one else has noticed this effect put it down to a vivid imagination.

What of the nourishment? A major problem is that prothalli are likely to be in a small bulk of compost for six months or more and will almost certainly run out of nutrients. Can a compost be devised that will provide very slowly released nutrients over this period or is it better to transplant the prothalli once or twice into fresh compost? Or just feed? Sporelings certainly grow much faster when transplanted. What sort of nourishment? Experience with the sort of fertilisers commonly used in composts like John Innes base, showed that fern roots are sensitive to these. The slow release fertilisers seem much better in this respect and prothalli have grown well with small amounts of these but still run out of steam after a few months. My standard compost now is of well manured garden soil, peat, sand (up to 1/8 inch sieved) and garden compost made

from plant stalks, seaweed, poultry manure and limestone grit up to $\frac{1}{8}$ inch sieved, in equal proportions. This provides a good physical mix put through a $\frac{1}{2}$ inch riddle and provides nourishment for a few months - sterilised for spores, unsterilised for sporelings in the hope of offering a good mix of mycorrhizal fungi. Experiments with Cocopeat instead of my somewhat stodgy and very acid peat are encouraging.

Feeding, in an emergency, works well, using a soluble high-nitrogen feed, at about a quarter of the recommended strength, with a pipette, drop by drop between prothalli.

Despite sterilisation by pouring boiling water over the pots of compost, I have had persistent trouble with moss until recently. At first I thought it came from airborne spores, then through the water, but after eliminating both of these the trouble had to be faulty sterilisation. I came across a most interesting publication called the *Moss Grower's Handbook* by a Michael Fletcher and learned things about mosses that the botany books omit. From his experience it seems that mosses exist as bits of protonema (roughly the equivalent of fern prothalli) in grains of soil and this fitted well with my own observations, both indoors and in the garden. The trouble was my lumpy compost - the heat was not getting to the centre of the lumps. So now I pour boiling water direct on the soil - no paper (which disintegrated anyway) - three or four times in quick succession. This is very effective but does strange things to plastic pots!

Another mystery, so far unsolved for many of us, is what makes prothalli germinate or, perhaps I should say, *not* germinate? Sometimes they grow and grow up to $\frac{3}{4}$ of an inch or more with frilly proliferations on their surfaces and edges but no fronds appear, even after 18 months. Do they have only one chance in their lives to produce sporophytes and if conditions are not right just carry on growing? A bit of a dead end from an evolutionary point of view! But we accept that ferns are different!

Obviously, there has to be some water on the underside to facilitate fertilisation but condensation will occur abundantly in cool periods of weather and at night. My own usually are very wet underneath, especially where they contact the soil. I did wonder if the even temperature of the propagating case was preventing this early in the summer so took out a box of pots and put them in a cold frame in August (probably too late) to imitate the falling temperatures and increased condensation of autumn. Both could have provided the spur. They were there for a fortnight and then returned to the propagating case. Two months later quite a number of fronds appeared but not the dramatic surge I had hoped for to prove the point. I get the impression that prothalli are programmed to produce sporelings at a certain size, perhaps $\frac{1}{4}$ of an inch across, if conditions are otherwise suitable. And if any fronds appear months later they are from late germinating spores. This is something the Victorians must surely have found out and no doubt some of our members have too.

There is a beautiful series of pictures of germinating spores and developing sporelings in C.T. Druery's *British Ferns and their Varieties*. He tells us that germination takes place in a "few weeks" and fronds appear "a month or more later", which for me does not happen often enough. We have to bear in mind that most fern-raising then was of easy *Athyrium* and *Dryopteris* varieties. Another thing to bear in mind is that they did not have plastic pots - even stood in a dish of water and covered with glass, earthenware pots would be much better aerated. I really must try to keep things drier.

We do not seem to have any reliable figures, as we have with seeds, of the longevity of fern spores. Most last 6-8 months, at least long enough for sowing the following spring. Some last for years and, as with higher plant seeds, storage conditions must have a marked effect. It seems logical to assume that many will not stand much drying, normally spending their winters in cold damp conditions, which means they should be stored in a fridge. *Osmunda regalis* is noted for the short life of its spores but it is evident that there are conditions under which they will live for a very long time indeed.

In September 1975 I was near Valencia on the SW coast of Ireland and noted on some of the peat bog workings a thin green line 3 inches down from the surface. It was made of many thousands of tiny plants with a round leaf about $\frac{1}{4}$ inch across on 1 inch wiry stems. Totally mystified I took a fist-sized piece home and twelve months later realised that I had a clump of many *Osmunda regalis* plants. Some are still in my garden. Evidently, there were viable spores by the million over acres of these bogs - but not a fern in sight. My own explanation is that these bogs were covered with *Osmunda* at one time and were "harvested" for their stems for orchid growing, for which they were highly prized. This was a widespread practice in parts of Wales too, around the end of the 19th and beginning of this century. This makes the spores 75-100 years old, - unless someone has another explanation? Certainly at 3 inches down in the peat they must have been there a long time.

Wondering if this could be turned to the advantage of the spore exchange, I have been experimenting with spores kneaded into a ball of freshly dug, sticky wet peat, (not the sort you buy in bales). A small portion mixed with water and spread on the usual compost showed good germination the following summer but few or none after two years. A small ball in a bottle hardly imitates the natural conditions; presumably, the spores would have been in conditions of little oxygen, high CO₂, no light and usually wet, not to mention the possibility of inhibiting substances in the peat (H₂S?) Easy enough to repeat in a laboratory if anyone has the facilities. I also tried keeping spores in a corked test-tube of water, but this did not work.

Inevitably, a few pests have turned up. During the winter of 1989/90 lots of tiny black aphids turned up in the warmed propagating case on young sporelings and potted plants, but, oddly, never on prothalli. A few proprietary aphid sprays were tried, cautiously, but the damage they did to young fronds (and sometimes older ones) was quite unacceptable and led to moulds later. They were not, I think, damaged by the chemical involved but by the detergent materials in the formulation used to reduce surface tension, a point fairly well confirmed by the use of a few drops of washing-up liquid in water, which was equally damaging. So what to do now? I discovered that "Vapona" strips containing diclorvos were still available so I hung a small one in the case, with quite dramatic results and no damage. The beasties keep returning, usually on just a few odd plants, so the strip is set amongst them with a sheet of polythene over. 24 hours is usually sufficient.

From time to time newly emerged prothalli develop frilly edges, suddenly diminish or disappear, or older ones curl up having apparently lost their roots (rhizoids). On one occasion I found a minute maggot associated so gave it the blame, and found that a minute spot of the forbidden DDT would usually stop the trouble. Then a visit from a nurseryman member told me what I needed. "Fungus gnats, try flypaper". I did, and over the next three weeks caught 60 in the case. Still an odd one turns up from time to time but hopefully not enough to give much trouble.

Another trouble is rotting prothalli, sometimes with a white filamentous mould appearing on the compost. The centre turns brown, and if they are thick, quickly spreads through them all. Fairly obviously caused by warm damp conditions, I am now trying to leave the case open for a few hours each day to let things dry off. I tried "Benlate" recently on a spare potful without any obvious damage, so it may be worth trying if things get desperate.

Perhaps I should be thankful for what I haven't got.

Mice are always with us and 1990 was a "boom" year for them. They are curiously selective. In the fern polytunnel they cleared my maidenhair ferns in a week, then moved on to *Pteris multifida* which were gone in a few days. Several mice were caught (including voles). Then another invasion got busy on *Cyrtomium fortunei*, but were stopped before

total destruction. Last spring they repeatedly attacked *Athyrium otophorum*. The odd thing is that closely allied species adjacent are ignored. They are not usually difficult to trap with peanuts but, at three or four mice a week, it means daily attention to the traps.

Somebody must have answers or bits of answers to some of these problems. Some of the hazards of an annual publication are that one forgets to write in until it is too late, and discussion by letter is almost impossible. If you have any thoughts, now is the time to make notes, put them on a piece of paper where you will be constantly reminded (diary?) and write them up around Christmas time. There is at least one other member who will be interested.

Looking on the bright side, if we knew it all, fern raising would not be such fun - but then we never will!

BLECHNUM SPICANT 'CONCINNUM DRUERY'

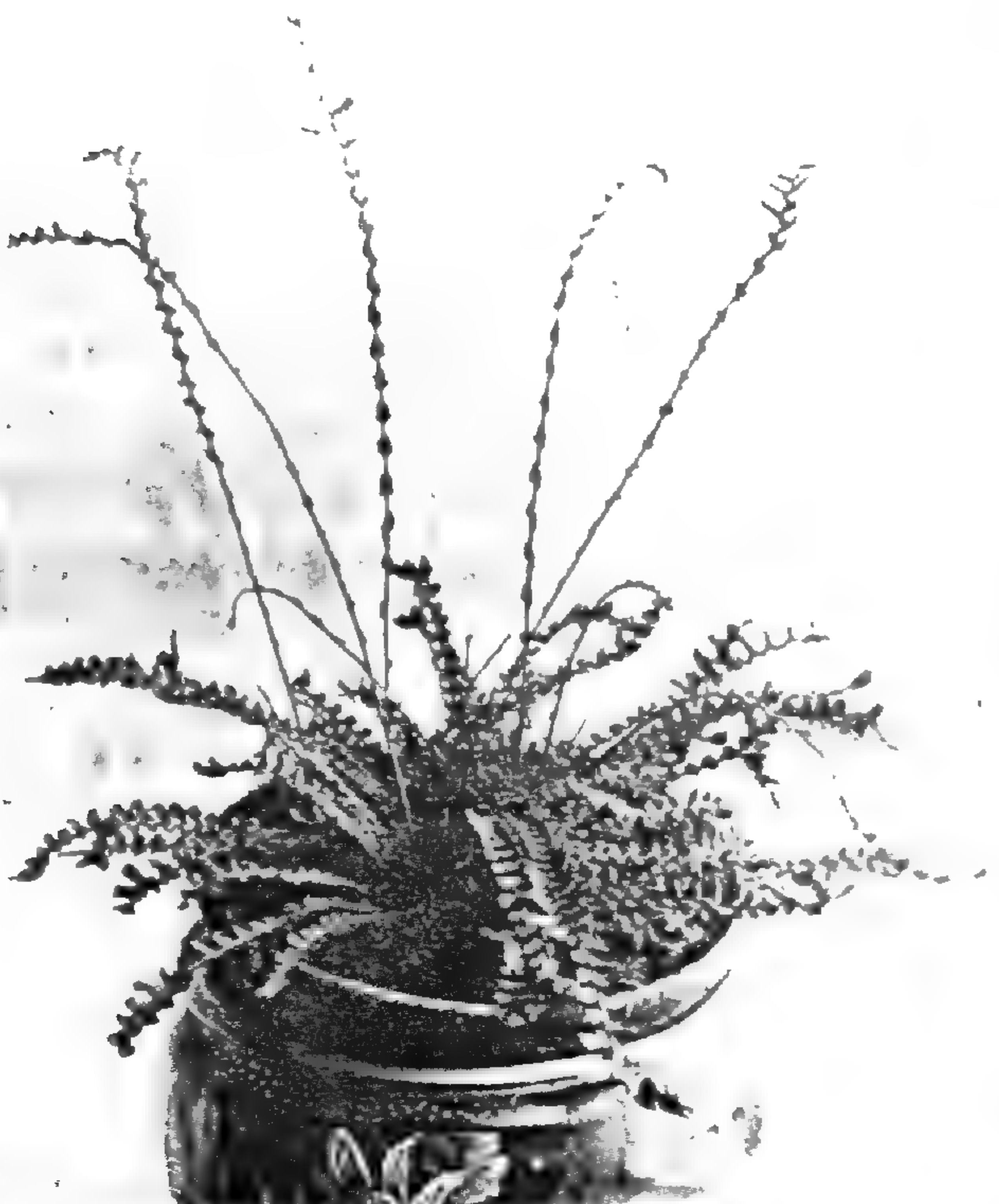
J. W. DYCE, 46 Sedley Rise, Loughton, Essex IG10 1LT

Following up my article on *Variation in Blechnum spicant* in the 1991 issue of the *Pteridologist*, Vol.2 part 2, I have to report a very pleasant discovery.

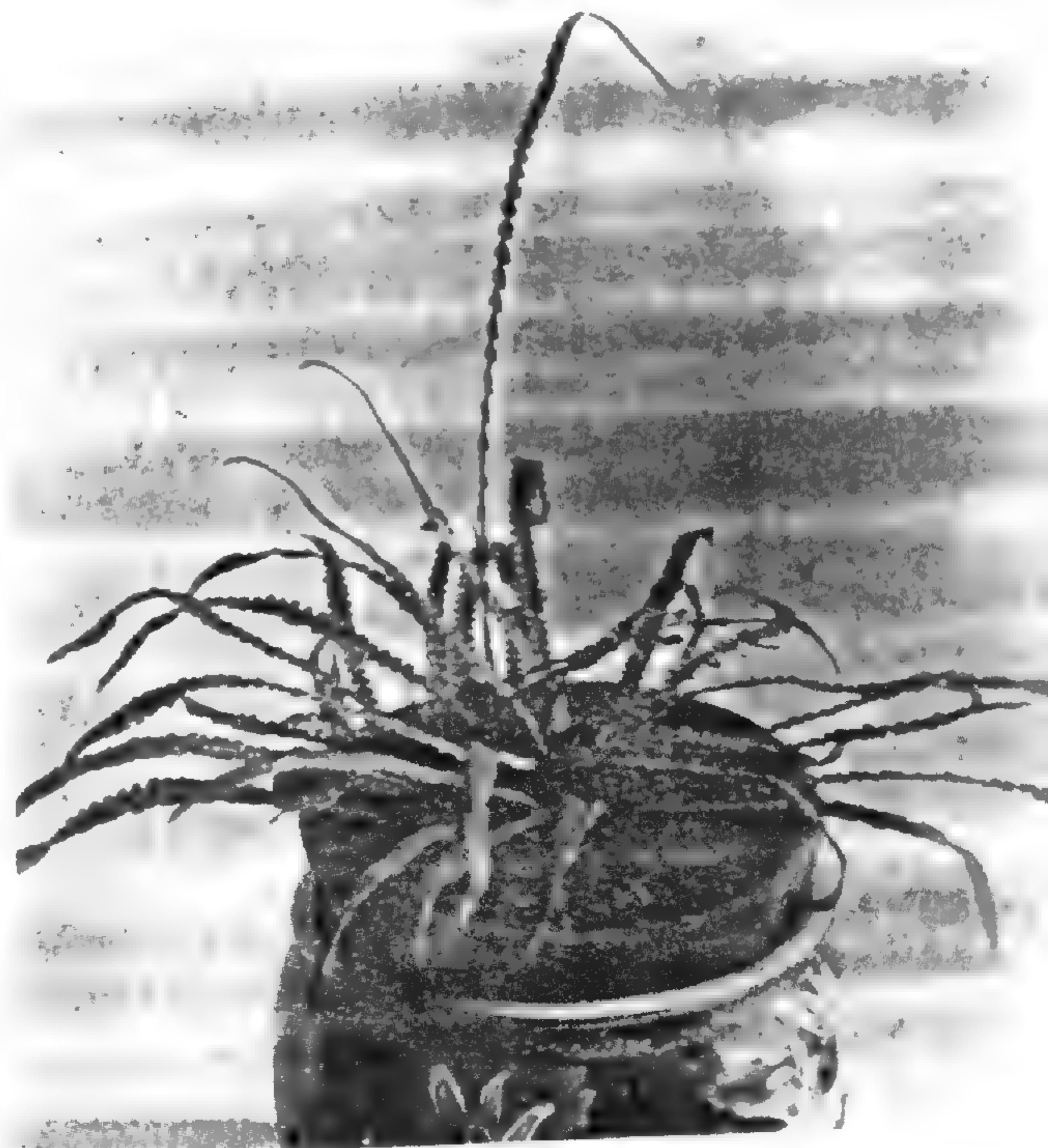
Browsing through a collection of old fern photographs which were passed on to me very many years ago by Percy Greenfield, I came across one photograph taken by Druery of his 'Concinnum Druery' variety of *Blechnum spicant*.

What a pity I did not discover this before my article was published last year! In it I lamented the fact that we had no photographs of the variety, and I am pleased that I can now remedy this omission. BUT, the mystery remains - WHY did Druery not use this photograph to illustrate at least one of his many published references to his 'Concinnum' which he regarded very highly?

Also among the photographs was one of 'Lineare Banks' which appears to have been a superb variety of the species.



Blechnum spicant 'Concinnum Druery'



Blechnum spicant 'Lineare Banks'

RAISING FERNS FROM SPORES

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The subject of raising ferns from spores has, I am certain, been covered many times in the journals of the B.P.S. by members more able than myself. However, I offer as an excuse for writing this article, the fact that it is a subject which seems to be of endless interest to fern enthusiasts, and that, moreover, I have been encouraged to write by several members who have expressed interest in a written account of my methods. Having been spore-raising for only some five years now, no part of the system here described can claim to have been tested over a long period of time though, in that short time, most of these methods have successfully produced large numbers of plants. Perhaps, more usefully over that time, a number of techniques, for almost every part of this system, have been tried and abandoned as inappropriate, or for various reasons unsuited to my disposition. What remains works well for me and, if so, therefore should work well for anyone.

The spores, are, of course, at the beginning of any method of fern growing. So far I have only used two sources, those sent out from the Spore Exchange, (over which no control can be exercised, but which always prove to be reasonably clean and pure when I grow them), and those collected from stock plants, and the plants of other members. When collecting from stock plants I do not go to great lengths to prevent cross contamination, but have so far been little troubled by it. Whether this is purely good fortune or, in part, the method of collecting the spores is impossible to say. Generally, however, I try, as far as is practical, to prevent contamination by such relatively simple methods as collecting each frond separately and sealing it in its envelope before the next is cut, keeping the envelopes away from the plants, and preferably collecting from plants which have not been grown too close together, as the number of spores falling on a frond from other plants must diminish rapidly as the distance from those plants increases. I really feel that this simple idea could make a big difference to the amount of contamination, especially when the spores are collected from a garden where many different ferns are often grown in close proximity to each other. It is probably highly desirable to wash the frond under running water and/or in a sterilizing solution at this stage, but so far I have not done this, though I do try to make sure that any frond used is free of all blemishes, moulds and rusts, etc. Nor are the spore envelopes sterilized but, in order to reduce risks, clean paper should perhaps be used. If possible, new typing paper taken fresh from, and stored in its packet, seems to be as good a choice as any and, possibly because it is smooth and does not readily gather dirt, it has proved quite good to date. At least the number of contaminated cultures I get are not too excessive.

As soon as a number of spore envelopes have been filled preparations for sowing begin, because I feel, as it seems do many people, that the fresher the spores are, the better they germinate. Not only that, but it makes sense, particularly if you do not run to any form of artificial day length correction, to sow in the natural season when the spores would be shedding and, hopefully, germinating, in nature. Certainly they will not germinate in the cold dark depths of winter, and sowing immediately can do no harm. The compost which is used for sowing the spores differs little from ordinary fern compost, and is commonly a standard soilless potting compost. One advantage of this is that, especially if you can get one of the professional products, they contain good wetting agents, making it easy to water both the compost itself, and any other ingredients which have been added to it. Additives which have been tried with some success include up to 50% crushed limestone and brick for spleenworts, etc., though even with this I still find that the spleenworts are one of the most difficult groups to germinate, except, perhaps, for scolopendriums which grow like weeds. Also, more commonly added is around 40% peat for calcifuges when not using an acid compost from the start. Especially when

using peat in the mix, I like to add extra bone meal to the compost to compensate for the dilution of nutrients caused by the additives. I feel that a little bone meal in a spore mix is a good idea anyway, as bone meal, of course, (apart from a little nitrogen which can at least do no harm), is principally a phosphate fertilizer, phosphate being the food most likely to be needed by small plants lacking an extensive root system, and the most difficult for them to obtain. If possible, the need for extra feeding later, when the prothalli or young ferns have begun to grow, should be avoided, as this will eliminate the chance of introducing contamination with the feed, as well as reducing work. In fact, I find it is rarely necessary to feed the plants again before pricking out. Therefore the bone meal, which is usually added at about $\frac{1}{3}$ the John Innes rate, would seem to be doing its job.

These compost mixes are used to two-thirds fill one pound glass honey jars, the compost at the bottom of the jar being usually used in its natural state, but the top inch or so is passed through a riddle. This is not to help the plants in any way, but simply because it makes pricking out easier if the sporelings, are not all rooted together into one large lump of compost. Indeed, since the prothalli have no proper roots, but only rhizoids shallowly attached to the surface, in all probability the texture of the growing medium makes little difference to them. At one time I placed gravel in the bottom of the jars for drainage but now think this unnecessary if the compost is not over wet. Indeed, the only real reason for filling the jars as deep as two thirds full is that this lifts the plants nearer the top to make for easier pricking out. Also, a larger volume of compost is, perhaps, more likely to remain evenly moist. Probably the best way to fill the jars is to fill them up to the top loosely, which will give approximately the needed depth when the compost is levelled and lightly pressed. The jars can then be watered with a fine rose to achieve the desired moisture content; this watering also helps to wash any stray compost from the sides of the jars, which can then be given a day or two to settle, to be sure the moisture content is correct and stable. I have finally settled on using glass jars for growing spores after having tried several other types of container, including plastic lunch-box type cartons, and the plant pots in plastic bags method, and am now convinced that glass jars are by far the best for several reasons. Firstly, because, as with the pot and plastic bag, it is a sealed closed system like a wardian case, which means that no extra watering will be needed after sowing. This reduces work and the risks of introducing contamination with the water. A sealed system also means there is no risk of the compost drying out if neglected, and since it is constantly moist, there is no risk of the prothalli being dry at the vital and, perhaps, short moment when the male gametes are released, it being unnecessary to give any extra water at this time under this system. Secondly, as most of the condensation forms under the metal lid, instead of on the glass of the jar, and the glass is much more easily seen through than many materials such as plastic bags, the culture can always be viewed and, moreover, without the risks of opening the container. Jars also have the advantages of being clean, tidy and durable, to my mind no small benefits, especially, since, if bought from a beekeeping supplier, by far the cheapest source I have found, they cost, with the lids, only about three times the price of much less convenient plastic pots. This is also considerably less than the price of similar jars bought from a wholesale chemist, or the glass lidded jars sold for jam making, etc. Although both these types of jar would be equally good, for the sake of economy it is perhaps worthwhile seeking out a beekeeping supplier, not hard to find in most areas.

Glass jars lend themselves readily to being sterilized by heat. The waxed cardboard wads used to line the lids have to be removed, of course, but as a completely airtight seal is not required, only one good enough to keep out the spores of moss and fungi, etc., these will not be needed. After loosening the lids of the jars, (do not forget to do this whatever else you may forget to do!) they can be placed in a compost sterilizer,

autoclave or domestic oven to sterilize; a microwave is not suitable because of the metal lids. For a long time I used a compost sterilizer to sterilize the jars with their contents, though I did find that the jars needed a little longer than a batch of compost, presumably for the heat to penetrate the glass. (Note that jars should preferably be cooled slowly.) I now, however, use a domestic oven which does the job equally well. If using an oven, the jars will need to be placed on the top or middle shelf, at gas mark one, for about an hour to an hour and a half, though this may vary from oven to oven. In an electric oven a setting just below boiling point will be needed. When the jars have cooled the lids can be screwed down tight. This, then, is another advantage of the glass jar over other methods, as this heating leaves the whole jar, including lid and compost, completely sterile and with the contents covered throughout; also, the original moisture content of the compost remains unaffected. Thus it is possible to have the jars already prepared with the correct moisture content. For most ferns, a little wetter than you would normally expect potting compost to be just after watering, seems to provide enough moisture for germination and growth, though I have found that cheilanthes did well on a much drier compost, and osmundas, etc., may need to be a littler wetter. Perhaps it may not matter much, as one experienced fern grower assures me that composts for spore-raising cannot be too wet.

Usually the jars are then left a day or so to settle down before sowing, but if a large batch has been made, they may be sealed down and kept as long as desired, or at least until there are enough spores to sow the full batch. Sowing is normally done in a draught-free room, naturally, away from any ferns. The spare jars and other packets of spores are kept in another room during sowing to avoid cross contamination. I rarely sow only one jar with the spores of one species, because it is easy to sterilize large batches of jars using the methods described. Sowing in more than one container gives some insurance of success, as there are always some failures in most sowings, and the jars being quite small, this costs little in extra spores. The way which I have found suits me best is to press a piece of paper a little larger than the top opening of the jars, onto the spores as they lie spread in the bottom of the spore envelope. When the paper is lifted off this leaves most of the dross behind in the envelope, then the paper is placed, with only the small number of spores that will have adhered to it, over the top of the jar's mouth and given a sharp tap. This gives an ideally thin sowing, and, since I have been using this method, over-sowing has rarely been a problem, and clumping out of the prothalli unneeded. After sowing, the name of the spores, and any other details wished for, are written on the lids of the jars with a marker pen. Then I remove the jars, envelopes and other materials from the room. Having cleared the room, the working surfaces are wiped with a damp cloth and hands are washed. This at least gives any stray spores time to settle.

As the jars are glass with metal lids they may be very prone to overheating if placed in strong sun, therefore, even if the ferns sown have a high light requirement, they must still be placed out of direct sun in, for example, a north window or shaded greenhouse. If the light levels are very low the jars may be spaced a little to reduce the shade given by the lids. Very rarely need anything more be done to the culture until the pricking out stage is reached. However, an eye can be kept on things, just to be sure that the moisture and fertilizer contents do not require topping up. I like to leave the pricking out until the sporelings are at least two centimetres high, as they seem to get going better if transplanted at this larger size. Transplanting is done with tweezers, fifty to eighty plants being transplanted to a seed tray; if done carefully it is possible to get several crops from each jar over a period of time. The trays with the sporelings must, of course, be kept in a close humid environment, such as they have been enjoying in the jars, since it is rather a lot to ask the sporelings to put up with being transplanted and to adapt to a lower humidity at the same time. This sort of humid environment

could be provided by a frame or propagator, but the method I like best is to place the trays of plants into plastic bags, supported above the sporelings by two or three wire hoops pressed into the compost at their ends. This system has the advantages that, firstly, it permits large numbers of trays to be used at the same time at little expense and, secondly, of allowing each tray to be treated differently, as, for example, when hardening off by opening the bags a little. The trays, I find, must be left in the bags for at least four weeks, or preferably longer, before hardening off. I do not bother to sterilize the compost in these trays to any great extent, at least not if it is fairly weed-seed free to begin with. The result of not sterilizing is usually a growth of moss, but this is only slow if the trays are kept covered, and plants of a good size at the pricking out stage seem well able to cope with a slight growth of moss, though it would be perfectly possible to sterilize the trays by pouring boiling water through them, in the case of, say, very valuable ferns. The plants are then left in the trays for as long as possible before potting, and I do feel that, as with pricking out, large ferns seem to get going better, which is the opposite of normal woody perennial plants. I do not know why this should be so; perhaps it has something to do with the way ferns grow, with the next generation of fronds and roots already forming towards the tip of their rhizomes.

Well, this is about all I can say on raising ferns from spores at present and I hope that it will be of interest to members. I am certain that raising spores is an interest which still has many surprises and new experiences in store for me and, if anyone has not yet tried it, for that reason alone I can highly recommend that you have a go.

BOOK REVIEW

A WORLD OF FERNS by Josephine M. Camus, A Clive Jermy and Barry A. Thomas, 1991. Natural History Museum Publications, London. 112 pp., numerous colour plates 218 x 275 mm. Price £9.00.

I suspect by now many members will already be familiar with this superb book, one of several published to mark the centenary of the British Pteridological Society. It is a general interest book, one that is a joy to browse and show to friends, who, perhaps, might not understand what we see in these plants. All the main groups of pteridophytes are represented with first class colour photographs, contributed free of charge by fern lovers from all over the world. This is a book of relatively few words but the chapters are organised to cover the fern life cycle, fossil ferns, ferns of the world by habitat and their leisure uses. It will serve as the perfect introduction to the world of ferns for the newcomer.

We will all have our own special highlights in the book, but I derived most pleasure from seeing tree-ferns in their natural montane grassland habitats on the Isle of Reunion and on Papua New Guinea; could they be hardy!? There are many, many other photographs worthy of mention but no space to itemise them here.

Inevitably, no two people would choose the same plates; for my part I would have preferred to see more cultivars of our British ferns included. The authors are all botanists and their preferences emerge in the selection of a rather larger proportion of photographs of examples of the unfernlike *Equisetaceae*, *Salviniaceae* and *Marsileaceae* than I would choose.

All round this is an excellent work which I am sure will help to popularise ferns. I thoroughly recommend it to everyone with any interest in natural history.

MARTIN RICKARD

DRYOPTERIS DILATATA 'JIMMY DYCE'

JUDITH JONES, *Fancy Fronds*, 1911 4th Avenue West, Seattle, Washington 98119, USA

Dryopteris dilatata 'Jimmy Dyce', as Martin Rickard and I are inclined to call this variety, was the mystery *Dryopteris* sp. in the nursery for some years. It made one of those spontaneous appearances as a population in some other culture sown from spore collected in Jimmy Dyce's garden in 1986.

As the population matured and a nice threesome adorned a prominent place in our display garden, customers began clamouring to have it. Should we gear up production on a plant with the dubious title of *Dryopteris* sp.? Unlabelled plants cause no end of confusion in the commercial trade. Large nursery companies delight in coining illegitimate names for market plants. I become unreasonably "bent out of shape" when a fern I introduced to the market turns up with a "new" name.

Everytime I took this plant through the *Dryopteris* key in Page's *The Ferns of Britain and Ireland* I landed squarely down in *dilatata*, except that it was somewhat atypical in its upright rigid habit and thick fleshy texture from the type plant. I sent fronds to Jimmy twice and he couldn't relate it to *dilatata* at all. I kept insisting there must be some historical precedent somewhere. In preparing this article I believe I have found it in Moore's *Nature Printed Ferns* and reiterated in Lowe's *Our Native Ferns*.

The plant that Moore describes as var. *valida* and Lowe as var. *vallida* is a perfect match in all respects, especially the form which both authors record was found by Mr. Tait in Monkland Glen, near Airdrie, Lanarkshire. First let us look at var. *valida* itself, using Lowe's description as it is a condensed version of Moore's detailed exactness:

"A handsome (infinitely so, we think) Fern, thick and fleshy (when fresh, not when dried). Fronds bipinnate, or often tripinnate (especially the lower pinnae pairs), large and broad. Stipes stout and moderately scaly. Pinnae broad and crowded. Pinnules more or less divided, almost to the midrib; oblong ovate, and curving somewhat forwards. The lobes oblong obtuse, lobate-serrate, with bristle-tipped teeth. The venules end on the margin on the upper surface in a hair-like white line, giving a falsely strigose appearance". This last sentence is a direct verbatim quote by Lowe from Moore. This character is only apparent under magnification and not the naked eye.

But the description of the form found in Monkland Glen and named subvariety *erecta* by Moore is the real clincher for me. Moore's description most aptly fits the primary distinguishing characteristics of this variety. It has "long stipites (meaning that the pinnae are distinctly stalked) and ovate triangular fronds, very erect in habit, pinnae distinctly concave, pinnules distinctly convex, having a crispy appearance. Length of frond above two feet". BINGO! It is this crispy appearance, due to the dichotomous nature of having the frond surface concave, curled forwards, and convex, curled backwards, at the same time, that has been so difficult to describe. This three-dimensional curved character is totally lost in herbarium material. As I hold a dried pressed frond next to a freshly picked frond the former is but a sad reflection of the latter.

It is no wonder that Jimmy could not recognize the plant which he collected in 1969 on the Isle Arran and which is still flourishing in his garden. (WAS now in my garden. Ed.). When I showed slides of my plants at the BPS Centenary Symposium in July, Martin (Rickard, of course) recognized the form immediately. In his own words (or a facsimile thereof) he remembers Jimmy and Fred Jackson each arriving back at the cars with a crown of what he thought to be rather unimpressive wizened *D. dilatata*. Ha!

Here in the U.S., especially in the Pacific Northwest, *Dryopteris dilatata* 'Jimmy Dyce' is gaining a well earned reputation as a top notch landscape plant. Because of its stiffly

erect form and its attractively domed caudex, complementary plantings may be meshed right up to the base of the crown and still be clearly visible. The fronds remain mostly evergreen for us, with deterioration beginning in the stipe so that the fronds may fall over after heavy rains or snowfall yet still appear attractive.

The fern is a natural for the commercial trade as it looks attractive at every size, a trait not always to be had with *Dryopteris*, especially the European and American ones. It has the typical *D. dilatata* verve for life and is a very successful self-sower.

Considering Jimmy's great zest for life and his far reaching efforts to make all BPS members part of the fold, no matter how far from England they reside, *Dryopteris dilatata* 'Jimmy Dyce' is certainly a reflection of his spirit - handsome, gregarious, and well-worth cultivating. (Phew! JWD.)

SHORTER NOTE/POEM!

Centenary Day on Whitbarrow Fell (Monday 23rd September 1991)

Figures in the midst
Hooded, clad, shrouded shapes,
Stepping, stumbling, all look the same,
Eyes ablink with biting rain,
Keenly searching the wild terrain.

Blurred outlines bend to eroded lime
Carved by the elements in concert with time,
Heads together in dual look alike,
Slowly advancing on the hike,
Peering downward into endless grike.

Voices falter against the wind
Keep together, don't get lost,
Along the ridge, half mile or more,
Then at an angle to unseen wall,
Over the pavements, mind you don't fall.

On the summit, where tracks meet
Hearty greeting, wind swept shout,
More of the party there to hail,
Take a picture, mountain style,
While we pause for just a while.

Leaning backwards, forwards, against the gale
All talk at once to tell a tale,
Did you see . . . ? What did you say?
They no longer call it viride!
I think it's affinis - over that way.

Then descending, the weather relenting
Morecambe's bay unveiled its view,
And progress now was greatly eased,
As spread below in gentler breeze,
Seemingly miles of cloud touched trees.

Line astern the order now
Steep paths yielding to a softer climb,
Soon at base for there to gather,
Laughing, joking, having braved the weather,
Recalling happy hours together.

AFFINIS WATCH

CLIVE JERMY, *Natural History Museum, Cromwell Road, London SW7 5BD*

ANTHONY PIGOTT, *43 Molewood Road, Hertford, Herts SG14 3AQ*

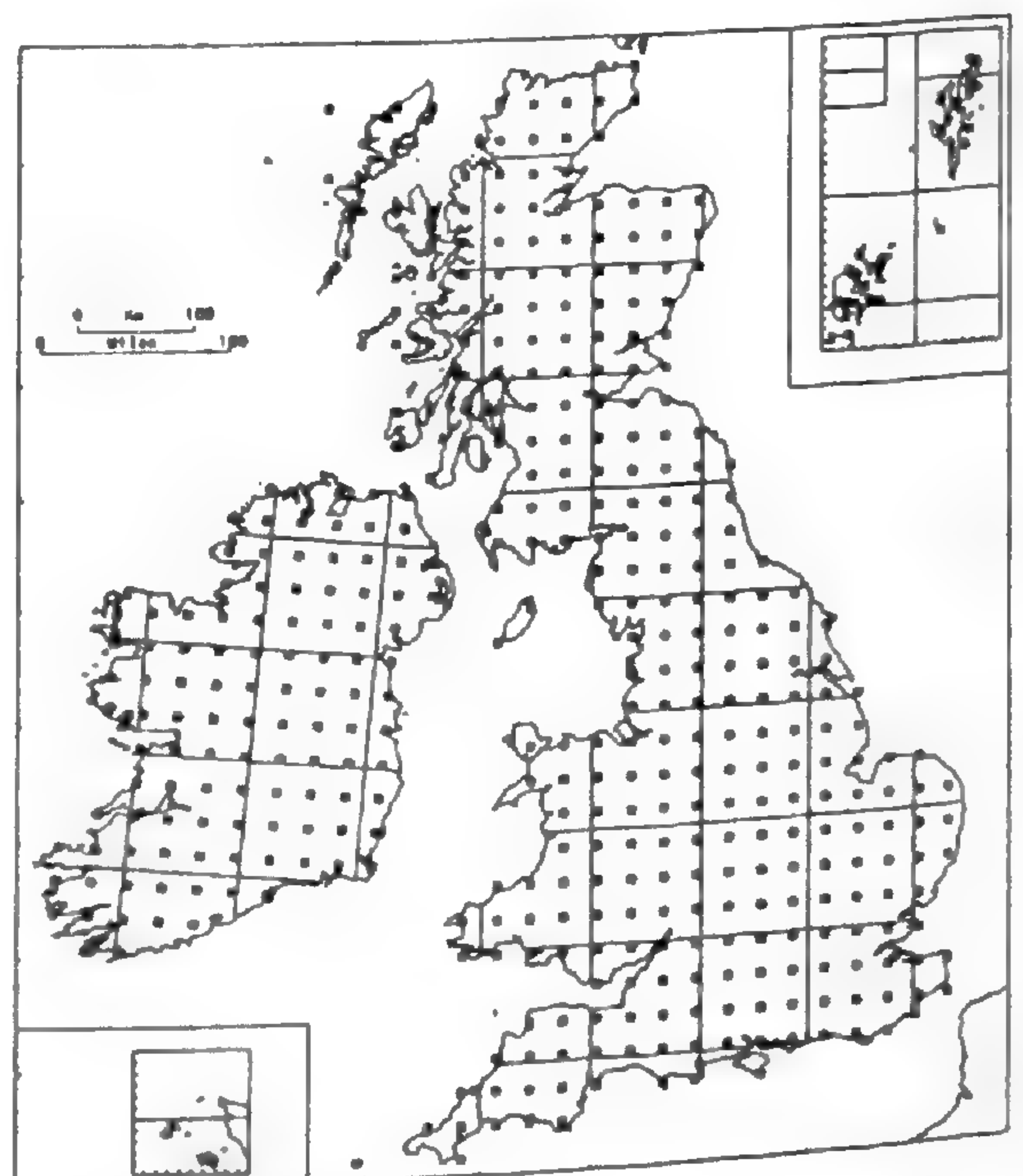
The Golden Scaled Male Fern, *Dryopteris affinis* complex, is one of the most fascinating systematic problem areas in the British pteridophyte flora. As we get close to the resolution of this puzzle, it seems a good time to start a mapping project to discover the geographical distribution of the various taxa within the complex. We would like any interested members to help us in this exciting project.

It is worth recalling a few points about the *Dryopteris affinis* complex. It reproduces without needing fertilisation, and so can easily form pure strains and partially fertile hybrids. The group appears to share some of its origins with the Common Male Fern, *Dryopteris filix-mas*, but at least one ancestor has still to be found. There seem to be three good species within the complex in the British flora, with seven or so distinct morphological forms.

For the last two years, we have been accumulating data on the various morphological forms, wherever possible using the same set of cultivated plants, to enable accurate correlation of distinguishing features. We have worked with Mary Gibby, who has carried out cytological examination of the plants. The information so far assembled includes photographic and scanning electron microscope images of sori, chromosome numbers and pairing behaviour, descriptive data on over thirty diagnostic characters and a computer 'expert system' that can be used to identify an unknown specimen. This year we hope to add iso-enzyme and flavonoid data, which may give conclusive evidence on the biological make-up of the complex.

In 1987-88, the Botanical Society of the British Isles organised a sample survey of the vascular plants of the British Isles to assess changes in our flora since the major survey carried out in the 1950s and 1960s. They recorded the presence of species in a sampling pattern of 429 pre-selected 10km squares in Britain, Ireland and the Channel Islands, and in each of these squares, they recorded the same in 3 pre-selected tetrads (2km squares). We are proposing to map the *D. affinis* complex on the same basis. This will give a reasonably precise and statistically sound picture of the geographical distribution of various morphological forms of the complex across the British Isles. All records will be lodged with the Biological Records Centre at Monks Wood.

People will be able to contribute by collecting fronds of all the distinct morphological forms that can be found in any of the 10km squares in the sample. Records from other squares not in the sample will also be very welcome. Anyone wishing to participate in the project can obtain a pack containing full details of the project, the 10km squares concerned, the latest identification notes on the known morphological forms, record cards and notes on how best to collect and preserve material can be obtained by writing to either B.P.S. Mapping Project, c/o Fern Section, The Natural History Museum, Cromwell Road, London SW7 5BD, or to A C Pigott.



10km squares in the BSBI Monitoring Scheme

EQUISETUM PARK

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

There is a number of problems in keeping horsetails healthy without letting them run amok. Kept in pots, there are problems with watering control, growth over the top and out of the bottom of the pots, silica and other deficiencies, and the root ball freezing in winter with disastrous results.

I started by trying to confine horsetails to clay pots sunk to their rims in the garden. I was unable to risk the more vigorous species as my wife threatened their total extermination if any escaped from the confines of their pots. Fortunately *Equisetum hyemale*, *E. x moorei*, *E. variegatum* and *E. bogotense* are very well behaved and have remained content to fill their containers while taking in water through the sides and bottoms of the pots.

For a long time I had the idea of sinking long drain pipes in the ground vertically. It struck me that you could sink the pipes and also confine the roots in a waterproof sink. I had it in mind to allow water to flow in from the top pool in the garden and run out into a lower pool, but a tank could also be free standing. Before building such a tank, however, care should be taken to consider what conditions horsetails will require, as moving such a heavy structure, once constructed, will be, to say the least, problematic!

Some horsetails definitely need shade and can suffer severe scorching in hot sun, especially if they cannot draw up sufficient water; *E. fluviatile* and *E. sylvaticum* are very sensitive to this. Others need to be in water or have very damp conditions. It will be shown, however, that quite a variety of conditions can be arranged in the same tank. (See Fig. 1)

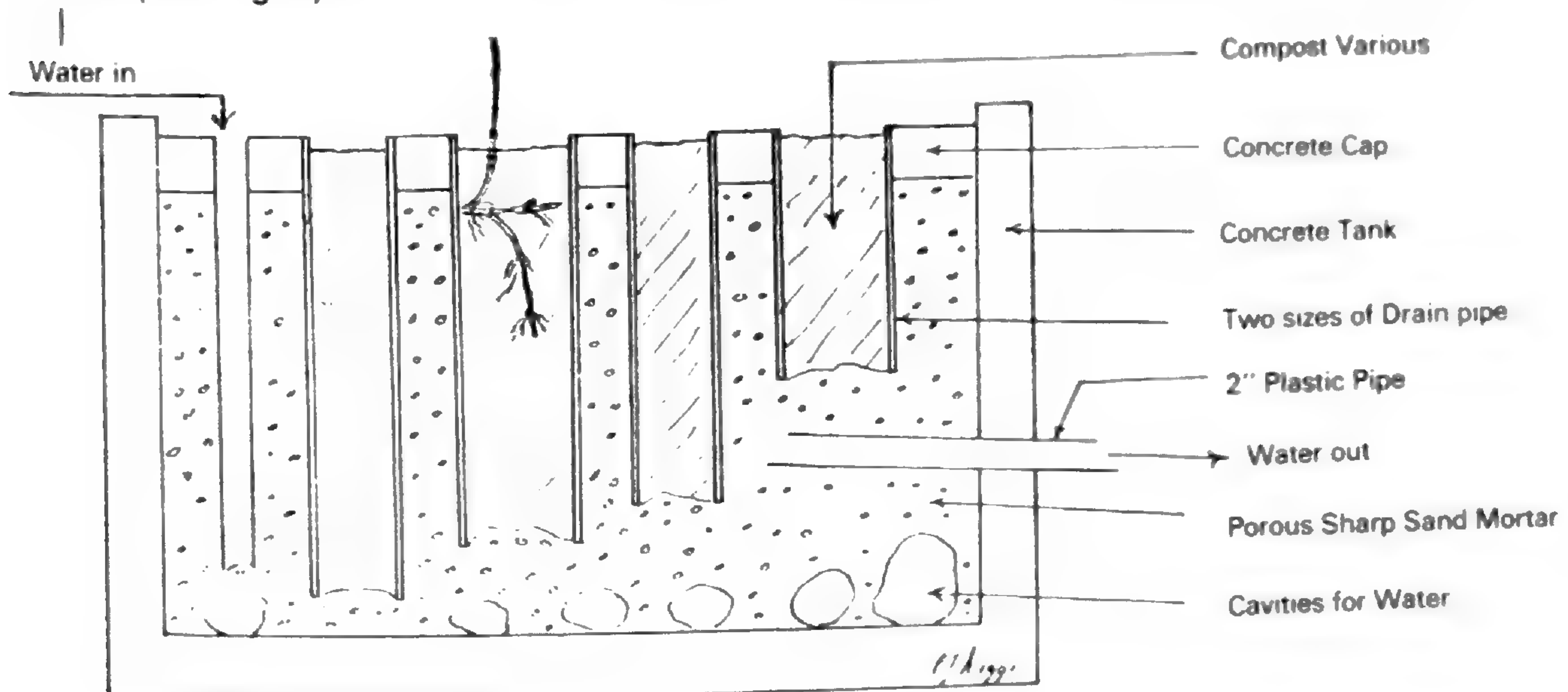


Figure 1 - Equisetum Park

I built a tank two and a half feet (75cm) deep by about two feet (60 cm) wide by three feet (90cm) long, using a strong concrete mix with a silicon based concrete additive to make it thoroughly waterproof. To avoid stagnation I fitted a two inch (5cm) plastic drain pipe about six inches (15cm) from the bottom as an overflow. The outflowing water is allowed to run into a lower pond making an essentially closed system. Once the concrete was set I made a 5 to 6 part sharp sand to cement mortar mix which was water porous. At this stage I also included some apples at the bottom of the tank to rot away and leave water cavities. Care must be taken, though, as it is important not to allow the horsetail roots to escape their confines.

Into the mortar I sank various lengths of 5 inch (12cm) and 7 inch (18cm) drain pipes cut into lengths from 15 inches (40cm) to 28 inches (70 cm). I used an angle grinder to cut the pipes, bought damaged from a builder's merchant. This is a hazardous job on two accounts, namely, the danger of the tool and the dust created. If in any doubt, I would recommend getting someone else to do it. An aesthetic arrangement of the two sizes of pipe were then placed into the mortar, making sure each bottom is sealed. I also included a two inch plastic pipe amongst the drain pipes so that most of the water passed down to the bottom of the sump rather than to a few favoured tubes. The porous mix was then placed around the outsides of the pipes to within three inches (8cm) of the top.

I fitted a plug of the waterproof mix across the top to cap between the pipes so that water could flow along the top and into various tubes in greater or lesser amounts.

From then on it was trial and error with various composts and which horsetails preferred which situation. I have not lost any yet in two to three years, but *E. fluviatile* does get badly scorched, and, you would probably have guessed anyway, *E. arvense* has escaped into one neighbouring tube!

EDWARD NEWMAN (1801-1876) IN THE WELSH MARCHES

MARTIN RICKARD, The Old Rectory, Leinthall Starkes, Ludlow, Shropshire, SY8 2HP

One of the first books on ferns that I bought back in the mid-sixties was *History of British Ferns* by Edward Newman (1854). By today's standards it is still an excellent book giving much information not available before or since. One of the features of the book was the fairly frequent mention of sites, mysterious to me at the time, such as Ludlow, Leominster, Titterstone Clee, Aymestrey and Shobdon in the Welsh Marches. About fifteen years later, by sheer good fortune, I moved into the heart of this region and began discovering these names for myself and something of Newman's ferny activities in the area.

In 1826 Edward's parents (George and Ann) moved to Leominster from Godalming in Surrey to join the family grocery business at 12 Broad Street, Leominster (now an estate agent's). Although it seems that Edward never lived in the town, we know (Newman 1876) that at about 1830 he started planting ferns in his parent's garden at Leominster, presumably at Broad Street. Then in 1836, with his brother Henry, he transplanted them all into one spot which he called his fern garden, adding a few species collected in Wales. He further developed the collection in 1837, 1838 and 1839. He was surprised how easily all the species could be cultivated (Newman, 1876). A full account of his fernery at Leominster is given in the introduction of *A History of British Ferns* (1840), reprinted in 1844, but left out of later editions. The garden was enclosed by walls on all but the north side, and further divided by "close imitations of the most unpicturesque stone walls that ever deformed the face of a hedge-less country"! (Newman, 1840).

Armed with the above information I hunted around the town of Leominster to try and find his fernery. Research led me to 46, Etnam Street. George Newman moved here from Broad Street in ?1836 and stayed until his death in 1845, when it passed to Henry (Edward's brother) until he moved out in 1855. The house was lived in by various members of the family until 1901 when Henry returned there to live until 1908, when he died. Sadly, for me, the house has now been converted to a children's home and the back garden is barren. It is, however, partially surrounded by walls and I feel pretty sure that this was the site of the 1836 fernery. Certainly in living memory (c. 1919) the garden was still well cared for.

Research into the Newmans in Leominster is rather complicated, and I am very grateful to Mrs Blanchard for unravelling all the relationships for me. There are several addresses which were inhabited by members of the family during the middle to late nineteenth century. One is the greengrocer's shop at 12, Broad Street, together with 14 Broad Street - both with little scope for a garden. Others were Newlands House, a Swiss chalet type building in spacious grounds on the western side of the town and, nearby, The Vista. Sadly, Newlands House was demolished earlier this century for the building of a housing estate, but even today evidence of the estate can be seen in the abundant *Cyclamen hederifolium* throughout the site and, in one garden, a few plants of *Polystichum setiferum* 'Divisilobum'. I have not yet been able to trace The Vista.

Rumour has it that there was a good grotto at Newlands House well stocked with ferns; however, I am beginning to question this because, not far away on the Barons Cross Road, the final ex-Newman residence I have traced still survives. This is Buckfield which was built in 1863 for Josiah Newman (another of Edward's brothers) when he moved from 14, Broad Street. On Josiah's death in 1885 the property was taken over by his son, Henry Stanley Newman JP. It is a magnificent property, typically Victorian, now divided into two homes. At the principal house entrance there is a long, glazed porch with ornate ironwork and a superb stone fountain. At the other side of the entrance archway there is one of the finest surviving Victorian grottoes that I have seen. This was built in 1872 by Pulham and Sons of Broxhorne, Herts. A later member of this firm, J R Pulham, was coerced into the secretaryship of our Society from 1948-50 by W B Cranfield, although he was not a fern man.

The work of Pulham and Sons was recently featured on the BBC TV programme *The Victorian Flower Garden*. The rockwork shown in the programme at Madresfield Court in Worcestershire was constructed in 1878-9, although dated 1876 in *Picturesque Ferneries and Rock Garden Scenery* by Pulham (c. 1877). It is remarkably similar in style to the one at Buckfield Keep (as the half of the house with the grotto is called today). Both are constructed of, mostly, artificial rock, presumably 'Pulhamite', which was made up of little more than a core of miscellaneous rubble faced with a rock coloured cement. At Buckfield, however, it does seem possible that the red sandstone rock is natural Herefordshire stone. These 'boulders' were very skilfully arranged into strata, giving the overall effect of a grotto in the best picturesque traditions. Pulham's description of the Buckfield Keep grotto suggests that, though small, it was one of his more imaginative efforts (Pulham c. 1877).

From the outside at Buckfield Keep there is little evidence of a grotto, apart from a large raised bank and an entrance through a small conservatory, glazed in typical Victorian style, with a rock surround (Fig. 1, opp. p. 132). Straight on is a small chamber where the vine in the adjacent vinery was encouraged to spread its roots. This is entered via a rock arch while, to the right through a short rock lined passage (Fig. 2, opp. p. 132) is the larger chamber, measuring about 20 feet wide by 30 feet long (6 x 9 metres). This is beautifully rugged in construction, including 'geological faults' in the rock strata. There is a raised walkway at one end over a grotto, dripping well and pool, plus a small glazed area, presumably reserved for filmy ferns. At one time the roof was glazed but it has been open to the elements since about 1950; nevertheless, some ferns have survived, including:-

Polystichum setiferum 'Divisilobum'
Cyrtomium fortunei
C. caryotideum
Asplenium scolopendrium
Pteris cretica
Adiantum capillus-veneris

Dryopteris oreades
D. affinis subsp. *borreri*
Selaginella kraussiana

At one time the collection must have been very impressive, as the estate agent's house sale details of 1914 mention 'Dixonia', 'Antarchia', (*Dicksonia antarctica*!) 'Woodwardia' and 'Radicaus' (*Woodwardia radicans*!).

The grotto at Buckfield Keep is part of a complex including several old Victorian iron-framed glasshouses. Thanks to the continuous efforts of its owner, Mrs Blanchard, the whole is in reasonable condition given its age, but it will continue to deteriorate all too quickly, unless funds can be raised in the near future for major restoration work.

This grotto never belonged to Edward Newman but it seems probable that he was consulted during its construction and planting four years before his death. We have it on record that he had a severe illness in 1873 but recovered quite well until his final illness in May 1876. I like to think that he was fit enough during the last years to visit Leominster and have some involvement in the establishment of the Buckfield grotto. Almost certainly, some of the ferns there today are descendants of the original Newman collections of around 1830. Is this the oldest surviving private fern collection in Britain? ! The owner of Buckfield Keep, Mrs D Blanchard, is happy to let BPS members inspect this grotto for themselves if they make a prior appointment; her telephone number is Leominster 612063.

There is one other grotto still surviving in Leominster. It is a smaller less sophisticated structure adjacent to Grange Court, which since 1939 has served as the Leominster Council offices. This grotto was probably built by a Mr Neild or more precisely by his wife, Helen, daughter of Henry (Edward's brother) with whom Edward had built up the original fern collection back in 1836. Ornaments and possibly ferns from 46 Etam Street were used in its establishment. The Neilds, like the Newmans, were Quakers. Grange Court has another Newman collection; it is illustrated in *History of British Ferns* 1854, page 257, as Leominster market-house. A year later, 1855, the building was dismantled and moved to its present site by a Mr Arkwright (of the Spinning Jenny family).

Although Edward did not live in Leominster he presumably used it frequently as a base for exploring the local countryside. The place names mentioned at the beginning of this article are within 15 miles of the town. Further evidence of his local rambles can be found in his accounts of Herefordshire Ferns (Newman, 1842) and *Butterflies and Moths* (Newman, 1869-70). It is a source of continual pleasure to me when I explore Shobdon Hill or search around Aymestrey quarry to think that Edward Newman walked there too. In many cases his records can still be confirmed.

Acknowledgements

I would like to thank Mrs Blanchard for permission to examine her grotto and for supplying many facts about the Newman family in Leominster. I would also like to thank Mrs Bentley-Taylor for alerting me to the existence of these Leominster grottoes.

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Fig 1 Entrance to grotto at Buckfield Keep



Fig. 2. Grotto at Buckfield Keep; passage from main chamber towards entrance

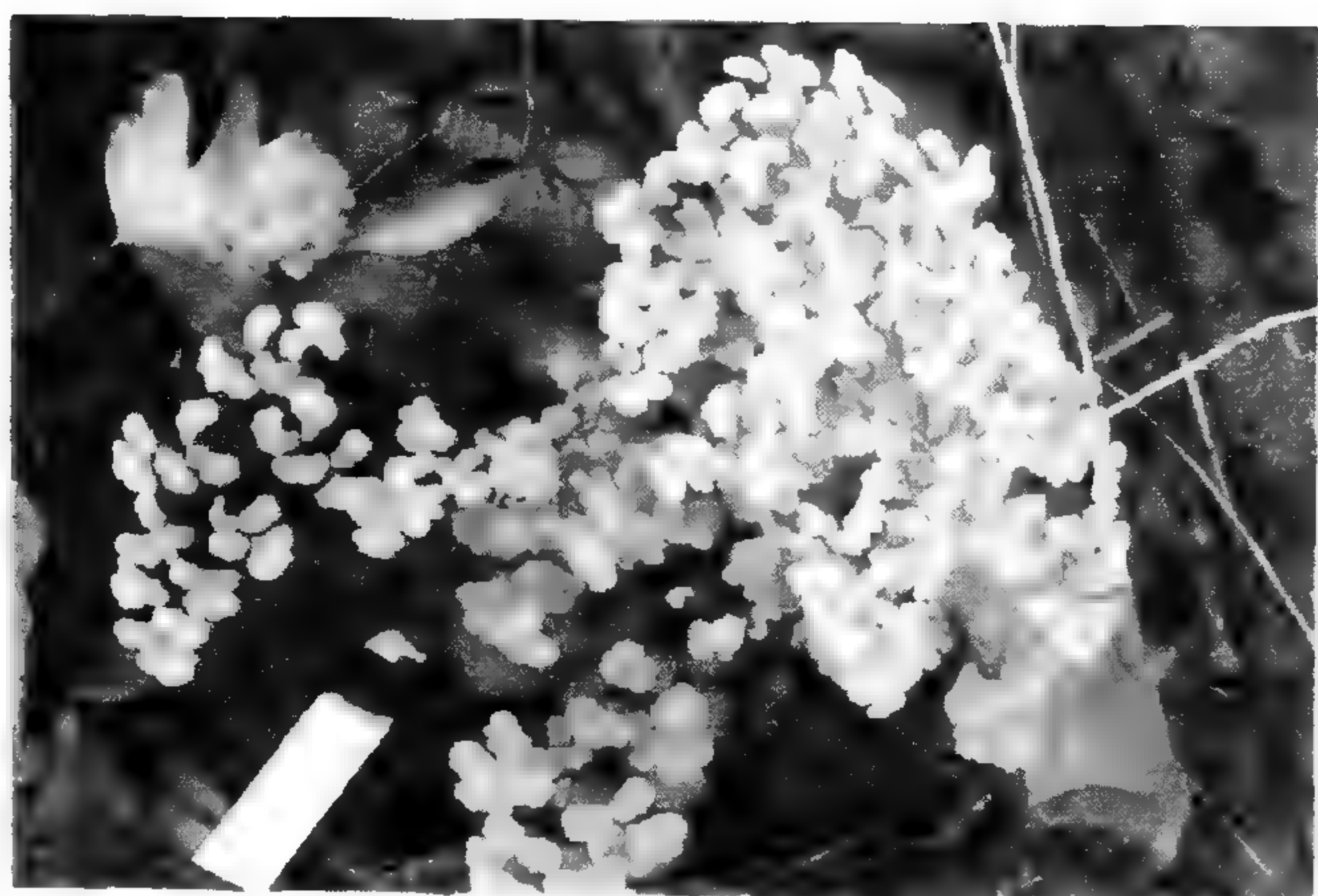


Fig. 1. *Adiantum poiretii*



Fig. 2. *Arachniodes denticulata*



Fig. 3. *Davallia mariesii* (left)
and *Polystichum vestitum* (right)



Fig. 4. *Phanerophlebia pumila*



Fig. 5. *Plecosorus spinosissimum*



Fig. 6. *Polystichum neolobatum*

SOME HARDY EXOTIC GARDEN FERNS NEW OR UNCOMMON IN CULTIVATION IN BRITAIN (Based on a talk given at the autumn indoor meeting at Kew, 1991).

MARTIN RICKARD, *The Old Rectory, Leinthall Starkes, Ludlow, Shropshire.*
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During the one hundred years since our Society's formation fern growers have tended to concentrate their efforts and garden space on the cultivation of our British species and their varieties. There is, of course, nothing wrong with that and I am a very keen grower of as many cultivars of our native species as I can raise or find. However, in the last few decades, propagating material from more exotic species has become available and the temptation to explore the potential for hardy introductions from overseas has become irresistible to many of our members.

My initial interest in growing hardy exotic ferns was boosted by meeting Gerry Downey of Bicknacre, Essex in the early 1970s. Living not far apart, we got together and exchanged plants fairly frequently. I was most impressed by the range of his collection, including many ferns I'd never seen before, e.g. numerous woodsias, many Northern American, European and New Zealand native species, as well as a large number of non-hardy types, including filmy ferns and young tree-ferns. At around this time my interest was further stimulated by the enquiries of another member, Richard Rush, who was actively in contact with fern growers around the world, bulding up a register of ferns grown out of doors in their respective temperate regions. Richard's research eventually led to the appearance of his excellent book, *A Guide to Hardy Ferns*, published by the Society in 1984. I am quite sure this book had a worldwide impact on fern growers, encouraging more and more experimentation with introductions into our gardens.

Obviously, quite a lot of hardy ferns had been in cultivation for many years (see Reginald Kaye's book *Hardy Ferns*, 1969), but if a recent explosion of interest in Britain can be traced back to any one factor it is almost certainly the extraordinary collecting ability of Christopher Fraser-Jenkins (CRF-J) and his influence on growers like Gerry Downey, Richard Rush and me. Throughout this period, while researching into various taxonomic problems, notably in *Dryopteris*, he has been all over the world collecting propagating material from hitherto untested species of temperate zones as well as upland regions in the tropics. His material has, unselfishly, been made available to the three of us at various times, as well as to the Royal Botanic Garden Kew, Chelsea Physic Garden and other members of the BPS, including a good collection installed at the Savill Gardens, Windsor. A lot of Christopher's collections, from potentially unpromising areas, have, surprisingly, become established and proved to be hardy over the last few winters at least. Notable examples are many high altitude species from Mexico, Hawaii and the Himalaya.

When I experiment with planting out new species I tend to play safe, and intially I recommend the following simple technique:

Plant out during the growing season, late June to October, the earlier the better, to give the plant maximum time to settle before winter. Of course, choose soil of the correct pH; if the fern's pH preference is unknown aim for a slightly acid substrata, i.e circa pH 6.5. Choose a shady site in the garden out of the prevailing wind, preferably on a slope. If no natural slope is available, try making artificial banks and mounds. Install the plant with its growing axis at 45 degrees, with its roots under a stone and the crown protected by the overhanging rim of the stone, so that its fronds grow out more or less horizontally. By this system the plants look natural and the crown is protected from excessive winter wet and cold. With prized specimens, straw, or dead lady fern fronds, etc., placed over the growing point throughout winter is not a bad idea. Some

species have the irritating habit of breaking dormancy during our seemingly inevitable false springs; in this case the insulation provided by straw etc. can prove doubly useful.

If an experimental planting fails, try again when further material is available. Don't automatically assume that the species is not hardy; remember there are many reasons why a plant can die!

The following list of apparently hardy species represents only a minute fraction of the ultimate potential for hardy exotic ferns, which could be as high as 2000 species in our lowland British climate (more in the mild south-west), but it will, hopefully, stimulate other members to explore this rich source of interesting plants for our gardens.

Adiantum poiretii - Mexico, via CRF-J. Each year I am frightened that this fern won't reappear but, so far so good after 4 years, it has! It is a most delicate maidenhair with yellow tinted indusia. 8 inches (20cm) tall. (See Fig. 1, opp. p. 133).

Adiantum x traceyi - North American hybrid between *A. jordanii* and *A. pedatum*. Judith Jones brought me this plant many years ago and it has thrived. It is not evergreen with me but it certainly lasts longer in leaf than most other adiantums. Fronds are large, 18 inches tall (45cm), sub-palmate, intermediate between the parents.

Arachniodes denticulata - Jamaica, Mexico, via CRF-J. Hardy for four years now, a remarkably delicate fern with quadripinnate fronds up to 12 inches (30cm) tall with me. Almost wintergreen. (See Fig. 2 opp. p. 133).

Arachniodes standishii - Japan. Hardy in a neglected Herefordshire garden for many years. Unlike other arachnioides in appearance and formerly kept separate as *Polystichopsis standishii*. 24 inches (60cm).

Blechnum chilense - S. America, or is it *B. magellanicum*?! I don't know, but gardeners generally seem to accept that the most commonly grown large blechnum is *B. chilense*. There are, however, two distinct equally hardy forms in cultivation; perhaps one is *B. chilense* and the other *B. magellanicum*? Very handsome, but rarely exceeding 20 inches (50cm) with me. In sheltered gardens in the south-west etc. the combined height of rhizome and fronds can reach 2 metres.

Blechnum minus - New Zealand. Long grown by Reg Kaye, it is presumably a calcifuge but does very well in a neutral soil on top of Westmorland limestone at Silverdale. A broad-fronded, pinnate, pale green species, up to 12 inches tall (20-30cm), with a creeping rhizome.

Davallia mariesii - Japan. Hardy in neutral rock work. The only Hare's Foot Fern of proven hardiness but the related *Davallia stenolepis* may be worth trying outside in a sheltered spot. 8 inches (20cm). (see Fig. 3, opp. p. 133).

Denstaedtia appendiculata - Himalaya, via CRF-J. A pale green species with finely divided quadripinnatifid fronds up to 3 feet tall (1 metre). Deciduous. Unlike *D. punctiloba* it is not invasive. An exciting new introduction, hardy for the last two winters.

Dryopteris crispifolia - Azores. Named and introduced into cultivation by Dr Mary Gibby (Gibby, 1984). Perfectly hardy and large growing, 30 inches (80cm), spreading fronds, superficially similar to *Dryopteris dilatata* 'Crispa Whiteside'.

Dryopteris lepidopoda - Himalaya via CRF-J. About 24 inches tall (60cm), very similar to *D. wallichiana* but has the great advantage of all new fronds being flushed a deep red colour until fully uncurled, as in *D. erythrosora*.

Dryopteris tokyoensis - a distinct species from Japan. Fronds erect, pale green, up to 30 inches tall (80cm) in Prof. Reichstein's southern Swiss garden. Pinnate or bipinnatifid.

Dryopteris wallichiana - Himalaya, Mexico, Hawaii, etc. Well established in cultivation but usually as a dark scaled form. The precise origin of this form is obscure but it is presumably Himalayan? Mexican specimens introduced by CRF-J with paler scales were formerly separated as *D. parallelogramma* but these have now been sunk into *D. wallichiana*. I have seen this fern about 6 feet tall (2 metres) in Prof. Reichstein's garden in southern Switzerland, but rarely taller than 3 feet (1 metre) with me.

Onychium contiguum - Himalaya, via CRF-J. Possibly the most finely divided of all ferns. 12 inches (30-40 cm). Fronds quadripinnate with ultimate segments almost linear.

Peranema cyatheoides - Himalaya. Noted as hardy in the nineteenth century but not seemingly in cultivation until reintroduced by CRF-J. Resembles a small untrunked tree-fern; its diagnostic character is the sorus suspended on a stalk. 24 inches (60 cm).

Phanerophlebia macrosora - Mexico, via CRF-J. A tall, 30 inch (80 cm), pinnate fronded relative of the cyrtomiums with a long stipe covered with papery scales, particularly near the base. Pinnae longer and narrower than most cyrtomiums. Only a few fronds are produced in early spring and autumn; possibly production is controlled by daylength (or drought?).

Phanerophlebia pumila - Mexico, via CRF-J. A small, 12 inch (30 cm), simply pinnate fern related to the cyrtomiums. Pinnae margins serrate, pinnae few and widely spaced. Produces more leaves annually than *P. macrosora*. (See Fig. 4, opp. p. 133).

Plecosorus spinosissimum - Mexico. A high altitude fern perhaps related to *Polystichum*. Collected by CRF-J. It is a very scaly plant with lanceolate fronds, hardy here for four years. Very distinct. So far fronds only 12 inches long (30 cm) with me, but often twice as large in the wild. (See Fig. 5, opp. p. 133).

Polystichum longipaleatum (*P. setosum*) - Himalaya via CRF-J. Magnificent large glossy fronds, 18 inches (45 cm), covered with pale brown bristles. Young fronds resemble bunches of hairy caterpillars!

Polystichum neolobatum - Japan. I was given this by Anne Sleep as not hardy in Yorkshire. Here in Herefordshire it has succeeded well with its capping of straw over winter. A beautiful glossy deep-green species, fronds lanceolate, bipinnatifid with a very hard texture, spiny to touch. 15 inches (40 cm). (See Fig. 6, opp. p. 133).

Polystichum nepalense - Himalaya, via CRF-J. Fronds pinnate and not unlike a more robust *P. lonchitis*, seems to be hardy here, foliage wintergreen so far. 12 inches (30 cm).

Polystichum squarrosum - Himalaya, via CRF-J. Virtually indistinguishable from *P. neolobatum*, but, if I haven't confused my labels, fronds of this species are reddish when young. 15 inches (40 cm).

Polystichum stenophyllum - Himalaya, via CRF-J and others. A charming dwarf pinnate species, fronds 6 inches (15 cm) long by less than one inch broad (2 cm), each with a bulbil near the tip. The fronds have a slight yellowy tint.

Polystichum vestitum - New Zealand. Hardy here in Herefordshire for several years, but remains small, 10 inches (25 cm). In the mild climate of Inverewe in north-west Scotland this species grows to an enormous size, perhaps 30 inches (70 or 80 cm). Rachis and stipe very scaly. (See Fig. 3, opp. p. 133).

Pteris wallichiana - Himalaya. Grown for very many years as a magnificent specimen plant by Lt-Col. Philip Coke at Stinchcombe in Gloucestershire. It is quite unlike bracken and not likely to be invasive. The lamina is fan-shaped (rather like *Adiantum pedatum*) held horizontally at the top of a naked rachis, about 3 feet tall (1 metre). Deciduous.

Stegnogramma pozoi - Spain, France and tropical Africa. Hardy with me in a humid, sheltered spot. The graceful pendulous, pale green, pubescent, lanceolate fronds are most attractive growing from a sheltered rock crevice. Deciduous. Calcifuge. 12 inches (30 cm).

Thelypteris erubescens - Himalaya, via CRF-J. Thelypteroids are not usually considered important garden plants, but this species could prove the exception if initial indications of hardiness are confirmed. The shuttlecock of fronds over 3 feet (1 metre) long are graceful in their own right, but there is the added attraction of aerophores (breathing structures) at the point where each pinna joins the rachis. Needs a moist shaded site.

Woodwardia fimbriata - a native of the Pacific Northwest, introduced to me by Judith Jones. A handsome erect species, up to 4 feet tall (120 cm), quite unlike the standard species of woodwardia with spreading fronds.

Woodwardia unigemmata - a beautiful near relative of *W. radicans* over which it has several advantages. *W. unigemmata* is hardier, surviving unprotected here for at least four winters (although remaining small); with protection it becomes enormous with 6 foot (2 metre) long spreading fronds, most with a single bulbil at its tip. New fronds are richly flushed with red.

Space precludes making the above list any longer, but I hope it gives some idea of the range of hardy ferns potentially hardy in our British gardens.

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SHORTER NOTE

Collectors' Corner

Following up Barry Thomas's *Shorter Note* in the 1991 *Pteridologist* 2. 2, p.80, it may be of some interest to record an amusing happening last summer.

Judith Jones, our Seattle, USA member and owner of Fancy Fronds Fern Nursery, stayed with me for two weeks after the *International Fern Symposium* held in July, during which she lectured twice. We spent the time, partly in the West Country, seeing ferns in the wild and visiting fern gardens. A visit was paid to Peter Boyd's Museum in Barnstaple (see *Pteridologist* 1.6, 1989). One of Judith's strong interests is in antiques and she found much to interest her in the Museum, particularly artifacts with fern motifs. One which particularly interested her was a Victorian chamber-pot, artistically decorated with fern fronds. One of her ambitions, we learned, was to possess such an antique.

Later, before she returned home to the USA, I took Judith to visit a large antique emporium in an Essex village, a few miles north of me. An energetic time was spent here and after making many purchases we descended to the ground floor to pay for them. While this was being done I had time to gaze idly around me, when my eye was arrested in a startling manner - on a shelf above my head reposed a chamber-pot and, surprise, surprise! - it was very beautifully decorated with fern fronds! Very cautiously (I knew what would happen) I drew my friend's attention to it. Pandemonium broke loose, the sales personnel were startled and Judith was like a dog with not two tails but twenty - there was no holding her!

As a postscript, it is interesting to add that, among the Society's memorabilia exhibited at our Centenary celebrations at our birthplace in Kendal, Cumbria in September 1991, two chamber-pots, beautifully decorated with fern fronds, were among the exhibits!

J W DYCE

FERNS OF THE ENGLISH LAKE COUNTRY - a new fern garden develops at Brantwood, on the shores of Coniston Water

E.S. BEAMISH, Brantwood, Coniston, Cumbria LA21 8AD

Brantwood, the large house to the East of Coniston Water with 'one of the best views in England', is perhaps best known as the home of the great Victorian patriarch, John Ruskin. However, the Brantwood estate has an industrial history stretching back to Medieval times and the remnants of a natural history stretching back 5000 years or more.

Brantwood House was built in the 18th century - a small Lakeland villa which has since been much enlarged. The house and 10 acres of woodland were sold in 1852 to W.J. Linton (see Fig. 1) - one of the finest wood engravers of the times. He was involved, in the 1830s, with the 'radical republican fringe of the Chartist movement' and was writing for ephemeral, more or less subversive magazines, whilst still producing superb illustrations for the respectable *Illustrated London News*. After the virtual collapse of the Chartist movement in 1848, Linton became disillusioned with politics and moved from London, first to Ravenglass in Cumberland and then to Brantwood, which was then in Lancashire. With his usual impractical and haphazard zeal, Linton set up a printing press to publish another crusading magazine, the 'English Republic'. However, as with many of his earlier ventures, this publication was short-lived, partly due to the inaccessibility of Brantwood from the printing suppliers and the railway.

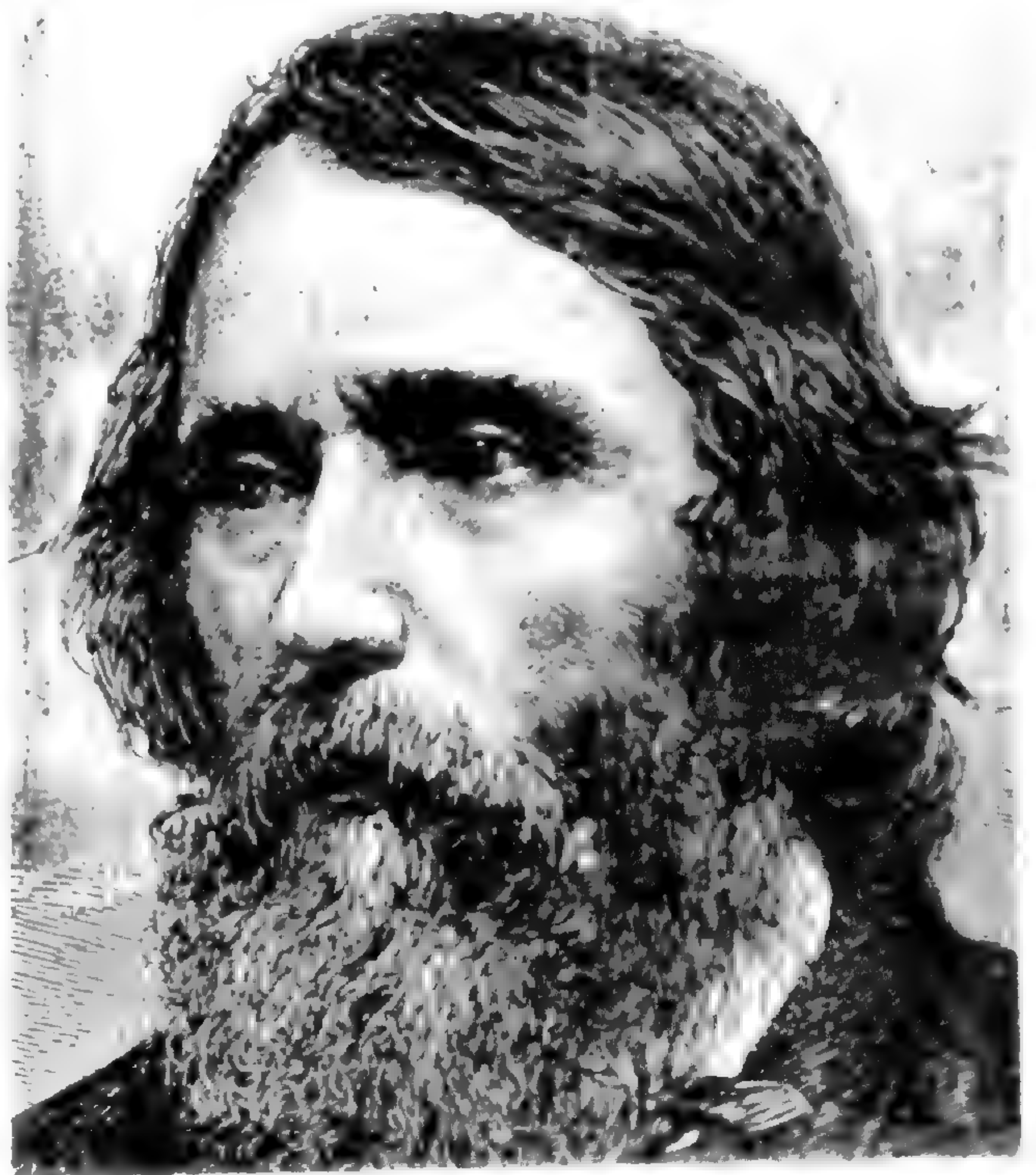


Fig. 1 W.J. Linton

As so often happens, Linton has his best memorial, not in what he thought was his most significant work, but in one of his hobbies. Whilst at Brantwood, Linton researched and wrote a small, but exquisitely illustrated book, *The Ferns of The English Lake Country*, published in Windermere in 1865. It is from this work that the inspiration for a new 'Linton Fern Garden' at Brantwood is being drawn. It was felt that the gardens, though largely to be designed around the principles and ideas of John Ruskin, also owed a memorial to Linton, the first serious gardener, writer, artist and botanist to live here.

Last Easter, it was decided to reopen the Ice House - a cave blown into the rock of the hillside by local quarrymen, lined with brick and mortar and used for storing ice throughout the year. The areas around the Ice House were densely overgrown with *Rhododendron ponticum*, presenting a rather dank and gloomy approach to the Ice House tunnel. In the archives at Brantwood there exists an etching of this area of the garden, showing its originally open woodland character. It was, therefore, decided that the steep, rocky wooded slopes above and around the Ice House with their naturally moist, acidic soil would be an ideal siting for a collection of fern species and cultivars based upon those listed by Linton in *The Ferns of The English Lake Country*. This project is being undertaken in three sections, with the help of 'The Friends of Ruskin's Brantwood' and other volunteers. The first bed, above and surrounding the Ice House, has been planted

with a collection of the indigenous ferns recorded by Linton as being found in the Coniston Valley, (see Appendix). Bed 2, further up the slope, will contain a selection of cultivars developed from the parent ferns in Bed 1. This area will be divided by an old pathway into, on one side, the more spectacular forms and, on the other, the 'quieter', less eye-catching ferns. A winding path leads on to the third area, which will contain examples of the other fern species mentioned by Linton as being found in the 'Lake Country', surrounded by a selection of their progeny. In this top bed, with its more gentle slopes, we also hope to take visitors in amongst the ferns to encourage a wider appreciation of these plants as individuals - the usual reaction to them often being 'Oh yes - ferns!' It is, therefore, going to be important that our labelling be accurate and easily legible and that any other interpretive material be simply written, but interesting and informative. If any of you, and particularly those in the Lake District area, are able to help with sorting out nomenclature and the relationships between the fern species and cultivars, I would love to hear from you. At present, we plan to label using the names that Linton quotes and the up-to-date names, as well.

The more involved we become with this project, the more we are realising the immensity and scope of our small corner of the fern world. I have discovered the presence of three editions of Linton's book - the second edited by Barnes and the third by Whitwell. I have yet to get hold of these last two editions, but gather that they are increasingly full of information, particularly about the many cultivars identified by the end of the last century.

We are also hoping to create a collection of mosses, as groundcover to set off the ferns. The propagation and cultivation of these is another subject, as yet to be investigated.

Our collection of ferns will gradually evolve over a number of years, being initially restricted by the large number of cultivars not available commercially. We will certainly be happy, in the future, to participate, with both spores and plants, in the British Pteridological Society exchange schemes, but will rely somewhat, in the early years, on the generosity of those with suitable plants to spare.

For anyone coming to the Lake District, we would be pleased for you to visit our Linton Fern Garden, and would welcome any advice or comments on our work. It is proving an exciting and immensely stimulating project for all involved.

Appendix

Ferns mentioned by Linton as being found in the Coniston Valley.

<i>Botrychium lunaria</i>	<i>Gymnocarpium dryopteris</i>
<i>Blechnum spicant</i>	<i>Hymenophyllum tunbrigense</i>
<i>Cryptogramma crispera</i>	<i>Hymenophyllum wilsonii</i>
<i>Dryopteris dilatata</i>	<i>Osmunda regalis</i>
<i>Dryopteris aemula</i>	<i>Phegopteris connectilis</i>

Other ferns mentioned by Linton as being found in the Lake Country.

<i>Asplenium adiantum-nigrum</i>	<i>Dryopteris carthusiana</i>
<i>Asplenium ceterach</i>	<i>Dryopteris filix-mas</i>
<i>Asplenium x alternifolium</i>	<i>Dryopteris submontana</i>
<i>Asplenium marinum</i>	<i>Ophioglossum vulgatum</i>
<i>Asplenium ruta-muraria</i>	<i>Oreopteris limbosperma</i>
<i>Asplenium scolopendrium</i>	<i>Polypodium vulgare</i>
<i>Asplenium septentrionale</i>	<i>Polystichum aculeatum</i>
<i>Asplenium trichomanes</i>	<i>Polystichum setiferum</i>
<i>Asplenium viride</i>	<i>Polystichum lonchitis</i>
<i>Athyrium filix-femina</i>	<i>Pteridium aquilinum</i>
<i>Cystopteris fragilis</i>	<i>Thelypteris palustris</i>
<i>Dryopteris x brathaica</i>	<i>Woodsia ilvensis</i>

THE IRISH RECORDS FOR OAK FERN, *GYMNOCARPIUM DRYOPTERIS* (L.) NEWMAN, A CAUTIONARY TALE

D SYNNOTT, National Botanic Gardens, Glasnevin, Dublin

Oak fern, *Gymnocarpium dryopteris* (L.) Newman, has been reported from nine Irish counties. A number of these records are certainly insecure and only five were accepted by Praeger (1901) for *Irish Topographical Botany*, apparently based on the assessments of Moore and More (1866) and Colgan and Scully (1898). The situation was unchanged when Praeger (1934) published his vice-county census in *The Botanist in Ireland*. Since then there have been reports of the species in Antrim (Stelfox, 1949) and Cavan (Jermy *et al.*, 1978, and Clapham *et al.*, 1987). Apart from some garden grown specimens only the Antrim records are supported by herbarium specimens though there can be little doubt as to the accuracy of at least three of the other sightings.

The first Irish record for the oak fern appears in Wade (1804), "...three branched polypody. Found in the stony parts of Turc mountain, Killarney; and among the rocks at the fall of Mam Turc, Cunnamara, Joyce country side". Mackay (1825) adds, "Foot of the Mourne mountains near Tollymore Park". "Tollymore" was to become 'Tullamore, County Offaly' in Moore's, *Nature Printed Ferns* (1855). Mackay (1836) calls the plant, "tender three-branched Polypody" and gives the Irish record as, "Dry stony places in mountainous countries. On the Mountains of Mourne; Turk Mountain, Killarney; Mam-turk, Cunnemara, etc.", and goes on to give an accurate description of the plant. The "etc" is apparently superfluous. All of these records were dismissed as errors based on beech fern by Moore and More (1866), "We fear that the stations in Districts 1 and 8 belong to *P. phegopteris*".

David Moore had found oak fern growing high up on Knocklayd, Co. Antrim, in 1836. There are three fronds of Moore's Knocklayd collection in the general herbarium at Glasnevin and four, two each in volumes 5a and 5b, in his *Hortus Siccus* of the Antrim flora, also preserved at Glasnevin. All of the fronds are sterile and one, in volume 5a of the *Hortus Siccus*, has a small piece of rhizome attached.

The Knocklayd record was first published by Newman (1844) but repeated in *Cybele Hibernica* (Moore and More, 1866). The species grew as "a single plant" according to Newman, or "sparingly" according to Moore and More. Stewart and Corry (1888) considered the plant extinct on Knocklayd, and Stewart and Praeger (1895) make the following interesting comment, "... a more unlikely habitat for this fern than the bare slopes of Knocklayd could not be imagined, ...could it have been planted there, as *P. Robertianum* was on Carlingford Mountain?". Johnson (1893) explains, "...in 1878 my brother and I planted a quantity of *Polypodium calcareum* on Carlingford Mountain... I write this note to let it be known ... that *P. calcareum* ... is not indigenous".

Stelfox (1949), in his report of exciting later finds, records a further possible sighting of oak fern on Knocklayd. Charles Oldham recalled seeing it there in May 1913. He was not aware at the time that oak fern was rare in Ireland, being familiar with it in North Wales. Oldham refused to allow his fifteen year old recollection to be published, since he feared that his memory might have played some trick. The ever optimistic Stelfox (1949) states, "Personally I have never since doubted that he saw the oak fern on Knocklayd, somewhat below the summit and on the north face of the hill". Moore mistakenly reported the altitude as 1800 ft.; the summit of Knocklayd is 1695 ft.

The Knockagh locality listed in Dickie (1864) is an error for Knocklayd.

There is another specimen of oak fern collected by David Moore in the Glasnevin herbarium apart from the Knocklayd specimens. It was collected at Castle Howard Park (County Wicklow) in July 1846. The specimen has a printed label which gives the habitat of oak fern as, "Dry stony hills", a reflection of Moore's only contact with the plant in a wild habitat in Ireland, but the specimen is undoubtedly from a cultivated plant.

Oak fern was next reported from County Leitrim, "Benbo mountain, near Manorhamilton, in Leitrim!, at 800ft above the sea, the late Mr. J. Wynne" (Moore and More, 1866). The use of the exclamation mark is not explained but probably denotes, as in later conventions, that a specimen was seen by the authors. A collection of fern specimens made by Wynne survives at Glasnevin. It includes Irish, British and Continental specimens, attributed to Mr. Mackay, Mr. Shepherd, Mr. Bishop, Capt. Durning and J.A.W. (Wynne), and among them are oak fern specimens from Inverness, Ingleborough and Wales, the last initialled, "J.A.W.". The collection cannot be dated but it demonstrates that Wynne was sufficiently interested in ferns to have identified the oak fern correctly. Wynne also reported beech fern from Glenade, Co. Leitrim (Moore and More, 1866) where it still survives.

Praeger (1934a) comments, "The Leitrim station for the oak fern (Benbo) was also examined in 1933 without success. The record is puzzling, for Benbo is a bare peaty hill of metamorphic rock with very little outcrop of rock and no suitable chinks where the fern might lurk, nor any gullies or glens".

Robert Warren made the next addition to the oak fern record. His report of the plant is in More (1872), "Near Lough Talt! on the Ox Mountains, Sligo". Warren (1897) gave further details of the Lough Talt record in a comment on Colgan's (1896) notes on the flora of the Ox Mountains, "It (oak fern) used to grow on the road side between some stones at the base of the fence nearly opposite the Police Barrack, where I found it, and sent some fronds to my esteemed and valued friend, the late A.G. More, and afterwards showed him some plants taken from that site, and growing in the garden here". There was no sign of oak fern in its Sligo station when Praeger searched for it in 1933. He reported (Praeger, 1934a), "No trace of the oak fern was seen in the fences (mostly old stone-faced) either on the road which passes the now ruined barrack, the newer road immediately below, or the short road connecting the two - only *Cystopteris fragilis*, *Asplenium trichomanes*, *A. adiantum-nigrum*, *A. ruta-muraria*, *Scolopendrium*, *Athyrium* and *Lastrea filix-mas*".

Warren was a friend and correspondent of A.G. More. He lived at Moyview, six miles north-east of Ballina, in County Sligo. On a visit to Achill in 1873 More became ill and noted in his diary for 6th August, "On return I found my friend R. Warren come to meet me and take me back to Moyview for a visit". More remained at Moyview for a time and was there again in August 1875 (Moffat, 1898).

The Clare record is in the same category, perhaps no more than a garden escape. It is, "Roadside between Broadford Village and the Cliffs of Moher, T.H. Wright" (Colgan and Scully, 1898). An obituary of Thomas Wright appears in the *Gardeners' Chronicle* for 5th October 1889. He was a member of the Society of Friends and described as a distinguished botanist and pteridologist and a large contributor to the *Flora of Cork* (i.e., Allin, 1883). Some of his plant specimens survive in the collection of Thomas Chandlee at Glasnevin (see, e.g., *Linaria repens*) but there is no specimen of the oak fern.

All of the Kerry records are dismissed by Moore and More (1866) as errors based on misidentifications of beech fern. The Muckross specimen in Taylor's herbarium (Newman, 1844) is likely to be from a cultivated plant.

The Wicklow records for oak fern, "At Sheenabeg near Aughrim, very sparingly, 1879, G.H. Kinahan" (Colgan and Scully, 1898) and, "Hill overlooking Glendalough, 1879, E.S. Marshall" (Marshall, 1899), are discussed by Brunner (1950) who attributes the first record to a *lapsus calami*, since the site is occupied by another rare fern, *Asplenium billotii*, and the second record to a trick of memory, being reported twenty years after the supposed sighting. Marshall's record (1899) was reported in a review, with additional records, of the second edition of *Cybele Hibernica*, which gave rise to a gentlemanly exchange of criticisms in the *Journal of Botany* for 1899 (pp. 269-272, 315-317,

456-458). In their reply to Marshall's rash criticisms they conclude with this piece of advice which is perhaps still helpful to visiting botanists, "We trust that he will continue to give it (the Irish flora) the benefit of his critical knowledge, and that a closer acquaintance with our island flora may have the effect of converting him to our scepticism".

Apart from the very dubious sighting of oak fern on Knocklayd in 1913 mentioned by Stelfox (1949) there have been two reports on the species in Ireland this century. In a very successful investigation of the Garron Plateau in 1949, Stelfox found "a nice clump of oak fern ... about 12-15 fronds" on the bank of the Pollan Burn (Stelfox, 1949), and comments, "I must agree with Dr. Praeger that the plant is more likely to be due to a chance wind-borne spore from Scotland than the last remnant of an Antrim colony". He continues in optimistic vein, "Nevertheless, if it occurs in a chink of rock by the Pollan Burn, there seems no reason why it should not occur in a similar situation alongside any river or stream in N.E. Ireland - or N.W. Ireland for that matter". The Pollan Burn plants were still there in 1975 (Hackney, 1982).

The other recent record for the oak fern is a dot (22/39) in the *Fern Atlas* (Jermy *et al.*, 1978) for the Bruse Hill area of County Cavan. This Cavan record is repeated in Clapham *et al.* (1987) but is an error (Curtis and McGough, 1988).

Conclusions

In the first half of the nineteenth century oak fern certainly grew on Knocklayd in County Antrim. Several other records for it were errors based on sightings of beech fern, *Phegopteris connectilis* (Michx) Watt. In the second half of the century oak fern was seen in Leitrim, Sligo and Clare by reputable botanists who had their records accepted by the distinguished compilers of botanical records of that period, Moore and More (1866), More (1872) and Colgan and Scully (1898). Specimens were apparently collected from each of the three counties but no vouchers survive. Two Wicklow records are thought to be based on a slip of the pen and a faulty recollection. Curtis and McGough (1988) suggest that oak fern became extinct in County Wicklow as a result of overcollecting but there is no evidence for this and I prefer to accept Brunner's view that the plant was in both instances recorded in error for the county.

The twentieth century records include a very dubious sighting on Knocklayd, Co. Antrim, an erroneous report from Cavan and an accurate and well documented find on the Garron Plateau in County Antrim.

Discussion

Since the oak fern has not survived in any of its reported stations in Ireland for more than a few decades and in view of Praeger's stated opinion that the Pollan Burn record is more likely to be due to a chance wind-borne spore from Scotland than the last remnant of an Antrim colony it seems best to regard the species as a short-lived colonist in Ireland. Indeed, wind-borne spores from garden plants might give rise to wild plants. Oak fern became established at the National Botanic Gardens, Glasnevin, in the early 1980's on peaty humus between rocks on a recently constructed wall near the rockery at a time when the fern was not in deliberate cultivation at the Gardens. The fern was grown at Glasnevin as early as 1804. In his catalogue of plants grown at Glasnevin, Underwood (1804) describes oak fern as a hardy perennial, "flowering" June to September, and gives it the English name, "Branching polypody". He does not give any country of origin for the plant though he does so for thirty-two of the fifty ferns listed in the catalogue, of which fourteen are from Ireland.

We know from the above records that oak fern was also grown at Castle Howard Park, County Wicklow, in the 1840's and also apparently at Muckross, County Kerry, where it was collected by Thomas Taylor who died in 1848. No doubt it was widely cultivated in Ireland as in Britain in the middle and later part of the nineteenth century during what has become known as the Victorian Fern Craze. It is a beautiful plant, and would

certainly have been sought by avid fern growers. Lowe (1865) states, "Nothing can exceed the exquisite beauty of this plant, nor the refreshing colour of its most vivid green fronds ... it must remain one of the most beautiful species of our cultivated ferns ... there is a delicious coolness in the colour of the fronds that is refreshing..."

Page (1982) points out that oak fern frequently grows with beech fern, whose ecology and geographical range in Britain and Ireland (!) it closely parallels, growing in upland oak-birch woodland, descending to nearly sea-level in the West of Scotland, often with *Oxalis acetosella*, *Viola riviniana* and *Anemone nemorosa*, also occurring with similar woodland species in moist rocky pockets amongst mossy screes on mountains with *Adoxa moschatellina*, *Chrysosplenium oppositifolium* and *Alchemilla alpina*. Beech fern in Ireland is usually found in mountain rock crevices. Upland oak-birch woodland is scarcer and the flora of our mossy mountain screes has less of an alpine facies than in Scotland. Suitable niches for oak fern are correspondingly fewer. Pioneer plants have seldom survived for long. The Pollan Burn record represents the longest surviving Irish population and the only one to be found in a natural habitat which might give the plants a greater chance of surviving and expanding to the relatively small number of suitable niches available. In fact the plant has shown no signs of increasing. Its status is precarious and it may already have disappeared from the site.

Oak fern appears to be an occasional invader from Scotland or from the shelter of Irish gardens. It has successfully established itself on a number of occasions in wild places but only for a limited period in any one station. It has failed to spread and can doubtfully be listed as a permanent member of the Irish flora.

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BOOK REVIEW

FERNS IN YOUR GARDEN by John Kelly, 1991. Souvenir Press. pp. 176, 260mm x 200mm. Price £18.99

This book is very well-written by a *real* fern lover. There is very much good sense in it, spoilt only by the fact that many old errors are perpetuated. In such an acceptable fern book, which is going to be popular and authoritative with readers interested in growing ferns and in bringing new recruits into the cult, the author has missed a golden opportunity to correct them.

There are nine chapters, covering all aspects of the subject, from ferns in gardens, in woodland, in rock gardens, in mixed borders and in pots. His potting information is very good and sound. His garden planting procedures are similar to mine, but with one extra excellent instruction (p. 35) which I shall adopt in future - first fill the hole with fairly **HOT** water; this should give the roots a better chance to settle down quickly. Another suggestion which I shall adopt in future writings is to use the word *persistent* instead of *evergreen* when referring to fern fronds which survive the winter in fresh condition.

The chapter which, to me, contains much questionable information is Chapter 6, *Fern shades and changes*. The author has chosen a bad example, in *Osmunda*, for a fern which produces two kinds of fronds, fertile and sterile. In this species the fronds do not look different, only some finish their apices with very soriferous pinnae. A much better example to illustrate the two kinds is *Blechnum spicant* in which they look and behave quite differently, the sterile ones outspreading with broad green pinnae and the fertile ones rigidly upright and very narrow.

The author persists in referring to *Polystichum setiferum* 'Plumosum Bevis' as 'Pulcherrimum Bevis'. For 100 years this fern was thought to be a variety of *P. aculeatum*. In *P. setiferum* there is a very small and very select section of variation called *Pulcherrimum* which is *entirely* different from 'Bevis' which, at the time of its finding, was authoritatively considered to be a *plumosum* but, unfortunately, the wrong name got published and it was not thought worthwhile to change it. BUT, in moving the variety into *P. setiferum* it became imperative to make the change. (See the *BPS Bulletin* 2, No.1, 1981).

The excellent quality of the illustrations in this book is beyond praise and both the author and his wife must be congratulated on their photography. The book is worth possessing for this alone and it is, therefore, the more disappointing that this is the part of the book which contains most of the errors. I would respectfully suggest to the author that, if the book runs to a second edition - as I am sure it will, he refers it first to some one who is a recognised authority on fern variety naming.

The book finishes with a chapter listing, with short descriptions, not only British fern species but also many foreign hardy ones which can add to the attraction of the fern garden. The Appendix includes a short chapter on *Fern Diseases and Pests*.

I noted with great pleasure that many of the photographs were taken in the King's Gatchell, Ottery St Mary, Devon garden of my good friends Kenneth and Dolsheen Adlam to whom the book is dedicated. This adds to the pleasure I have in giving the book a place on my fern bookshelves.

J.W. DYCE

SHORTER NOTE

Selected abstracts from 1990 and 1991 Fern Gazettes

Over this period there were three papers on diseases of ferns. In 1990 Hick and Preece give a very interesting review of rust diseases; many are more common than you may think, especially on *Asplenium scolopendrium*. Woods, in 1991, gives further information on rusts on ferns in Mid-Wales, while the third paper, by Irvine, McElwee and Burge, also in 1991, shows how curl tip disease of bracken has the potential for use in biological control of bracken.

Cytology and taxonomy receive a lot of attention. In 1990 Rasbach and Reichstein gave an account of the cytologically non-homogeneous genus *Anogramma*; variations between geographically distinct populations suggest there may be additional taxa awaiting description. Walker (1990) gives an account of Gleicheniaceae in Costa Rica. If the cultivation of these unusual ferns could be mastered, at least one of the species discussed here, *G. costaricensis*, might be hardy in Britain, as it was collected at an altitude of 3100 metres. Rasbach, Rasbach and Bennert (1990) give new records and new cytological results for the fern flora of Madeira, where *Asplenium adiantum-nigrum* and *A. x ticinense* are recorded for the first time. In 1991 the systematic status of *Matteuccia intermedia* was discussed by Kato, Suzuki and Nakato; recent information has shown that *M. intermedia* is not a hybrid but a distinct species related to *Onoclea orientalis*, a new name is therefore proposed - *Onoclea intermedia*.

Three new hybrids are described. One, *Asplenium x artanense* by Rossello and Cubas (1990), is a new diploid hybrid from Mallorca, Spain, which has probably resulted from a cross between *A. sagittatum* and *A. trichomanes* subsp. *inexpectans*. It is a striking plant superficially similar to the long known, but very rare, *x Asplenophyllitis* hybrids. The second is a new natural hybrid in the genus *Pteris* from the Kumaun Himalaya described by Pangtey, Samant and Verma (1990); one parent of this hybrid, *Pteris x khullarii*, is thought to be *P. wallichiana*. Finally, Bennert, Rasbach, Rasbach and Viane (1991) announce the discovery of *Dryopteris x furadensis*, a new endemic fern hybrid from Madeira; it is probably a hybrid between *D. aitoniana* and *D. maderensis*.

Several interesting accounts of pteridophyte distribution are given. Pickering and Wigston (1990) discuss the occurrence of *Lycopodiella inundata* on china clay at Lee Moor, Devon. Six new populations of *Isoetes x hickeyi* in Canada are reported by Brunton and Britton (1991). Young and Leon (1991) give a valuable account of the diversity, ecology and distribution of high-elevation pteridophytes within the Rio Abesio National Park, in the Peruvian Andes (2300 - 4200 metres); several of the species from the alpine list are hardy in Britain; it would, therefore, be interesting to test others when material becomes available. Variation between ecotypes in *Equisetum variegatum* in Britain is discussed by Stark (1991). This was research part-sponsored by the BPS Greenfield Fund.

From fossil evidence, Thomas and Quansah (1991) argue the palaeobotanical case that the genus *Selaginella* should be divided into at least two genera.

Reviews, 1990:

Flora of the British Isles by A.R. Clapham, T.G. Tutin and D.M. Moore.

Ferns and Fern Allies of Canada by W.J. Cody and D.M. Britton.

New Zealand Ferns and Allied Plants by P.J. Brownsey and J.C. Smith-Dodsworth.

1991:

Proceedings of the International Symposium on Systematic Pteridology by K.H. Shing and K.U. Kramer.

South African Ferns and Fern Allies by J.E. Burrows.

MARTIN H. RICKARD

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PTERIDOLOGIST

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THE
BRITISH
PTERIDOLOGICAL
SOCIETY

PTERIDOLOGIST

*Edited by
M.H. Rickard*



THE BRITISH PTERIDOLOGICAL SOCIETY

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The BRITISH PTERIDOLOGICAL SOCIETY was founded in 1891 and today continues as a focus for fern enthusiasts. It provides a wide range of information about ferns through the medium of its publications and available literature. It also organises formal talks, informal discussions, field meetings, garden visits, plant exchanges, a spore exchange scheme and fern book sales. The Society has a wide membership which includes gardeners, nurserymen and botanists, both amateur and professional. 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*, Society business and meetings reports.

Membership is open to all interested in ferns and fern-allies. **SUBSCRIPTION RATES** (due on 1st January each year) are Full Personal Members £12.50, Personal Members not receiving the *Fern Gazette* £9.50; Student Members £7; Subscribing Institutions £20. Family membership in any category is an additional £2. Applications for membership should be sent to the Assistant Secretary (address above) from whom further details can be obtained. (Remittances made in currencies other than sterling are £3.00 extra to cover bank conversion charges). Airmail postage for all journals - an extra £4.00, or for those not receiving the *Fern Gazette* £2.50.

(Front cover: *Asplenium Scolopendrium* 'Laceratum Kaye')

Back numbers of the *Gazette*, *Pteridologist* and *Bulletin* are available for purchase from P.J. Acock, 13 Star Lane, St. Mary Cray, Kent BR5 3LJ, from whom further details can be obtained.

This issue is dedicated
to the memory of
REGINALD KAYE
1902 - 1992

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Reginald Kaye with his Honorary Master of Science degree, with Jeremy Kaye and Her Royal Highness Princess Alexandra

PRESIDENT'S ANECDOTE

I first met Reggie Kaye when my main horticultural interest was Alpine plants but even then I realised that he was quite a lot more knowledgeable than the majority of plantsmen I had encountered up and down the country.

But Reg could never remember my name!!!

The day dawned when my garden pursuits advanced to the study, collecting and growing of ferns and it did not take me long to realise that the author of one of the best-known fern books was the same person who owned the Alpine nursery where some of my plants had been purchased. So over I went to Silverdale - this time to buy some ferns and it was then that Reggie showed me round his fantastic garden.

After a few more visits, Reg still could not remember my name!!!

Some time later I wrote to him to ask if a few of us could visit his nursery and garden. I signed the letter with my Christian name, enclosed a S.A.E. and received a reply soon after inviting us over. So on the day, as arranged, a couple of car loads arrived at Silverdale and there standing near to his sale room was Reggie, complete with pipe. It was quite obvious that he recognised me as he walked over and said in a quiet voice "Hallo, which one is Jack who wrote to me?".

I feel sure that had my name been "*Didymochlaena trunculata* pseudo 'Jacques' " he would have remembered.

It was certainly an uplifting experience to be in his company and he will certainly be missed by many.

JACK BOUCKLEY

EDITORIAL

Reginald Kaye died on August 31st 1992. It had to happen one day, but it is still sad to think of the passing of such a good friend. I'm sure that members' meetings with him were usually dominated by fern talk but there was so much more to him. He was an accomplished pianist, he would frequently sit and play at the baby grand piano - squeezed into the front room! He loved sport, particularly tennis - although I can't imagine how a nurseryman could ever find time to indulge this passion! During winter evenings he studied astronomy and navigation, became involved in amateur dramatics, acting in, and producing, a number of plays. In later years he took up painting, a pastime he was able to share with his wife, Marion, as they spent many happy hours together attempting to capture the essence of the Lakeland countryside.

Of course, it is his interest in ferns which most concerns us here. Reg's work directly for the Society was less important than some others, notably Jimmy Dyce and Clive Jermy, but he made a very significant contribution towards keeping fern growing before the public eye, culminating in the publication of his excellent book *Hardy Ferns* in 1968. Details of ferns raised and introduced by him are given elsewhere in this issue, but he was also a leading enthusiast of alpine and other select herbaceous plants, a love shared by his son Jeremy. Work in non-fern areas is outside the scope of this journal but in passing it is worth saying that his private garden housed one of the best collections of alpines.

Today we are fortunate that Reg was able to pass much of his knowledge onto his grandson, Dominic, and that Dominic is planning to perpetuate the fern nursery at Silverdale. At the time of writing (March 1993) Dominic is in Seattle, Washington State,

USA, working with our member, Judith Jones, learning how fern nurseries are run over there. When he comes back he will be even better qualified to look after, and multiply, all the priceless treasures that Reg accumulated at Silverdale. We hope he will be as successful as his grandfather – a tough act to follow.

One aspect of Reg's nursery work was the trade displays he mounted at flower shows. These were of the highest standard, often incorporating tons of Westmorland limestone. Unfortunately, I do not have a record of his shows and medals but I do know he was a regular exhibitor at Southport and had at least one stand at Chelsea, in 1939.

My wife and I were able to attend Reg's funeral along with six other Society members. It was a strange occasion. People were not upset, there was a general feeling of well-being, it was as if Reg was present and approved of the proceedings! We were all so happy that Reg, at the age of 90, had been able to receive his Honorary Master of Science Degree from Her Royal Highness Princess Alexandra, only two months before his death. (See frontispiece). A fitting climax to the life of one of the great fern men.

This issue of the *Pteridologist* is, therefore, dedicated to the memory of Reginald Kaye. Although not exclusively given over to articles of relevance to Reg, I hope it will serve as just one more happy memory of a man who gave so much pleasure to his family and so many of his friends in the British Pteridological Society.

(For more details, see his obituary in *BPS Bulletin*, 4, 129: 1992).

REGINALD KAYE

J W DYCE, 46 Sedley Rise, Loughton, Essex IG10 1LT

It is now over six months since my old friend, Reginald Kaye, died in August last year in his 91st year. I still miss him sadly, although practically the whole length of England separated us, and in the latter years of our lives (I am now 88) we were able to see very little of each other. Mental laziness, one of the penalties of old age, also contributed and slowed down our correspondence and interchange of fern knowledge.

This led to a great tragedy – on medical advice Reg had to give up his efforts to write and publish a second edition of his book, *Hardy Ferns*. Martin Rickard had already been helping Reg with some of the hardy exotic species new to cultivation so, on hearing of Reg's decision to abandon the book, Martin and I volunteered to "ghost write" it for him. Soon afterwards it seems that Reg sent all the material, his writings, line drawings and photographs, to me. The parcel never reached me and, as I did not want it to appear that I was hurrying him, it was six months later before we contacted each other and learned of the loss. By this time the "trail had gone cold" and the Post Office could not help us. However, the book is too valuable to the fern world and, with the help of the publishers, Martin and I are now working on an enlarged second edition which will be a lasting memorial to our departed friend.

I did not get to know Reg until after the 1939/45 War when I was given the task of bringing our Society to life again after a lapse of 8 years. He joined the BPS in 1929, some years ahead of me, and was already well "into ferns" in the pre-war years while I was still struggling in the beginner stage. Association with Reg and with my fern mentor, Percy Greenfield, the pre-war Secretary of the Society, rapidly increased my fern knowledge and a friendship with Reg was begun which lasted for over forty years. Away from his fern nursery, which was very time-demanding, we saw very little of each other. That nursery has been a very powerful magnet which has drawn me, and many others, to Silverdale over the years. Reg did make time to give lectures on his ferns, illustrated by his superb colour slides – he was an accomplished photographer

and a skilful artist, on canvas as well as in stone in the garden. His magnificent fern rock garden in Silverdale remains as a monument to his skill in the last-named accomplishment. He made time, too, to do a lecture tour on ferns in the USA, where he was feted by the many fern enthusiasts in that country who love our British fern varieties.

On the occasions, regrettably all too few, when I could visit him in Silverdale it was an inspiration to see his extensive fern collection and drool over his many treasures. An unforgettable time was spent by the late Bert Bruty, from Kew Botanic Gardens where he was in charge of the Fern Houses, and me, many years ago, when we volunteered to give Reg a week's free labour to bring the collection back into shape after an unavoidable period of neglect. This was not a labour but an education and my knowledge of British fern variation improved vastly as a result.

I could tell of many more happy times spent with Reg and his wife Marion who was also a skilled painter, but space forbids. I am left with many happy memories and a greatly increased knowledge of ferns from my long association with Reginald Kaye.

FERNS INTRODUCED BY REGINALD KAYE

MARTIN H RICKARD, *The Old Rectory, Leinthall Starkes, Ludlow, Shrops. SY8 2HP*

During his 60 plus years as a nurseryman Reg Kaye raised very many new forms of our British ferns; he also was given new forms by other enthusiasts and rescued ferns from old collections. Of these new forms many, inevitably, closely resembled earlier finds but a few were distinct and of sufficient merit to justify selection, propagation and naming. Over such a long period of time it is impossible to give a comprehensive account of all Reg's introductions but with the help of his son, Jeremy, and grandson, Dominic, I have compiled the following list. I would be very happy to hear of any additions.

Adiantum pedatum 'Miss Sharples'. The history of this cultivar is that it was amongst a collection of plants amassed by Miss M Sharples on whose death Reg was offered the contents of her garden as the ground was to be built on. The plant was labelled 'Miss Sharples' as being its source. Reg was unable to trace its provenance. A Dutch nurseryman called at the nursery, presenting bottles of brandy all round and asked permission to get a few spores from the fern garden. He was left to collect any he fancied. He raised a large stock of 'Miss Sharples' and they were distributed far and wide. Bright golden green in spring. Earliest listing I can find is 1982, but I believe Reg first had it in 1965.

Asplenium scolopendrium (Crispum group) 'Kaye's Splendour'. The sole plant struggled for survival at Silverdale after it was described in the *Pteridologist* in 1988. A beautiful form, fronds deeply crisped and lance shaped, I fear it is now extinct. Raised from 'Crispum Moly'.

Asplenium scolopendrium (Crispum group) 'Kaye's superb'. See *Pteridologist* 1988. A tall deeply crisped form raised from 'Crispum Moly'.

Asplenium scolopendrium 'Ingeborg'. Named after a Dutch lady who admired it in the nursery. An erect ramose marginate cultivar.

Asplenium scolopendrium 'Laceratum Kaye'. The most widely known of the Kaye ferns. It was discovered on a wall in the Silverdale nursery as a couple of chance sporelings in 1953 or 1954. Jimmy Dyce pointed it out to Reg but it is quite possible that Reg had noticed it earlier. Apparently comes 100% true from spore. First described and illustrated in the *British Fern Gazette* in 1956; the Latin cultivar name is therefore correct and legal.

Asplenium scolopendrium 'Sagittatum Cristatum Superbum Kaye' A selected form of 'Sagittatum'.

Asplenium scolopendrium 'Stagshorn'. A selected form of ramo-marginate type

Athyrium filix-femina 'Angustato-cruciatum Kaye's Variety'. A selected cruciate form where the narrow frond is cruciate throughout its length.

Athyrium filix-femina (Grandiceps group), described as 'Crispum Grandiceps Kaye' in *Pteridologist*, 1985. A chance sporeling in the nursery in 1948. See account in *Pteridologist* 1985 for full history and description. Listed in the 1989 catalogue, but not available for sale!

Athyrium filix-femina 'Grandiceps Kaye'. I wonder if this is distinct from 'Crispum Grandiceps Kaye'.

Athyrium filix-femina 'Nudicaule Cristatum Kaye'. An extraordinary form of grandiceps completely lacking any pinnae. Listed in his 1980 list as *A. filix-femina* 'Nudicaule Cristatum Kaye's Var.' - a very finely dissected dwarf form. This cultivar still lacks a legal name.

Athyrium filix-femina (Percristatum group) - marked 'XXX' in the garden by Reg as a sign of special quality. Probably a sporeling at the nursery.

Athyrium filix-femina (Plumoso-cristatum group) 'Kaye's sporeling'

Athyrium filix-femina 'Sabine'. A delicately cut dwarf crested form

Athyrium filix-femina 'Semicruciatum'. Listed in the 1957 catalogue. Fronds cruciate in terminal half only.

Dryopteris dilatata 'Crispa Whiteside'. Resurrected from Robert Whiteside's collection. A beautifully crisped form of *Dryopteris dilatata*. See *Pteridologist*, 1984. First offered in 1983.

Polystichum setiferum (Brachiatum group) 'Eaves Wood'. A wild find in Eaves Wood not far from Silverdale. Brachiate forms in *P. setiferum* are very uncommon and I believe this is the only extant form. The fronds are crested. As is usual with brachiate cultivars this is slightly inconstant.

Polystichum setiferum 'Broughton Mills'. Found in the Lake District at Broughton Mills by Jimmy Dyce and Reg in 1968. Such a good cultivar would need two of the finest fern men to find it! A beautifully crisped dwarf congested form. There is some confusion over whether or not this cultivar is crested; in the 1982 catalogue Reg says it is lightly crested. Close examination of my plants reveals that the tips of the pinnae are twisted to superficially resemble small crests; however, the tips are not crested. I think this discrepancy might be explained if small crests develop if plants get bigger. A gem.

Polystichum setiferum (Divisilobum group) 'Goffey'. Sometimes called Mrs Goffey but listed by Reg in 1957 as 'Goffey'. Possibly not originally from Reg but I always think of this magnificent fern as one of his. Broad fronds spread horizontally with extremely finely divided sharp pointed pinnules, three feet across.

Polystichum setiferum (Divisilobum group) 'John Jeremy Kaye'. A wild find within a quarter of a mile of the nursery by Jeremy Kaye. Probably a chance spore from the nursery.

Polystichum setiferum 'Foliosum Superbum Kaye'. A beautiful plumose form. Each pinnule slightly sickle-shaped and foliose.

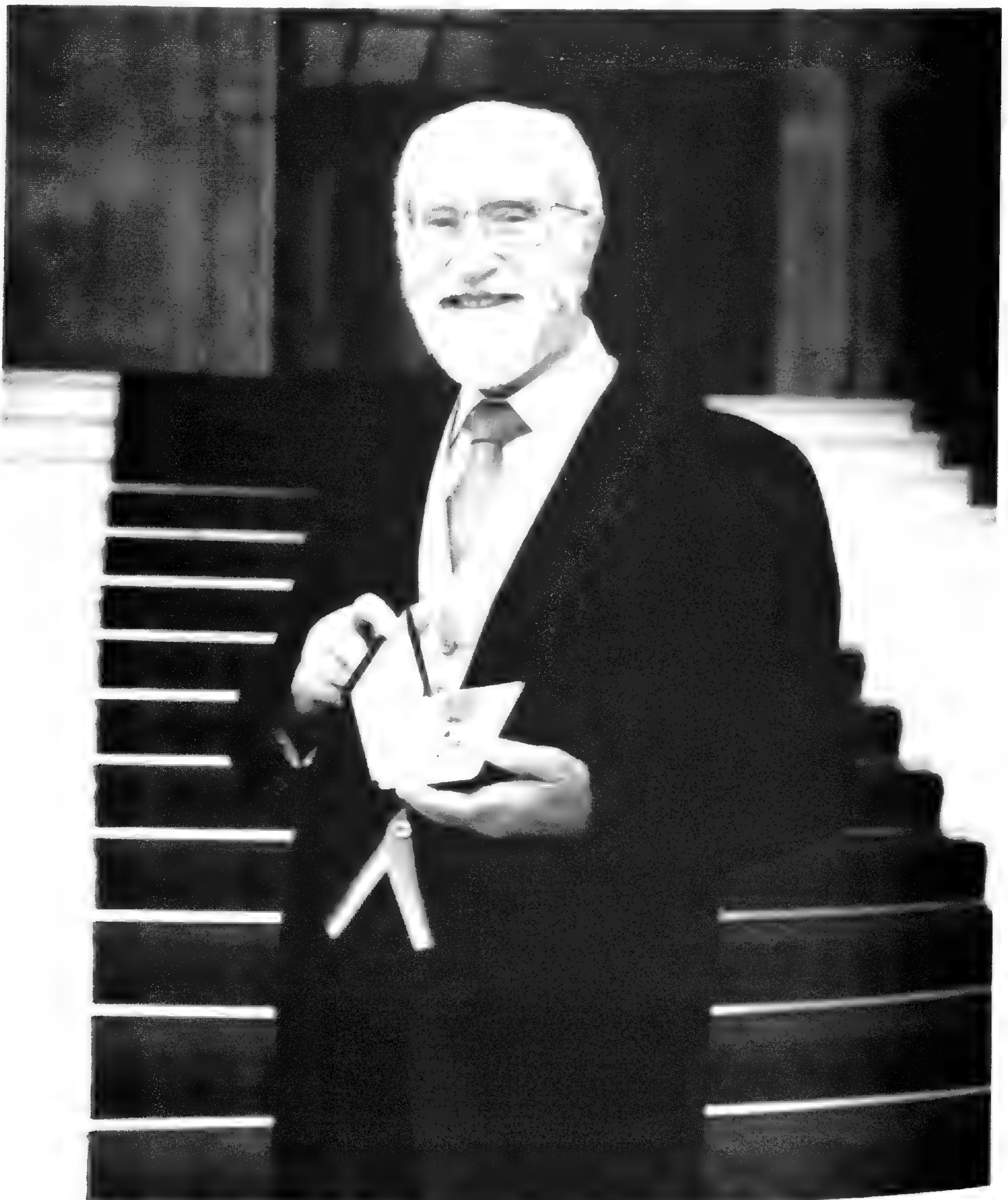
Polystichum setiferum (Tripinnatum group) - marked XXX in the 1983 list. Obviously a particularly good form.

In addition to all these cultivars, Reg was also responsible for bringing many hardy exotic species into cultivation. For example *Polystichum falcinellum*, *Athyrium palustre*, *Asplenium fissum*, *A. lepidum*. No doubt there are others.

Most important of all was the fact that Reg maintained such a superb collection of fern cultivars at Silverdale. Without his collection many fewer ferns from the past would be in cultivation today.

HONOUR FOR JIMMY DYCE

All members will be delighted to know that our President Emeritus, Jimmy Dyce, has been invested as a Member of the Order of the British Empire (MBE) at Buckingham Palace by Her Majesty The Queen in February this year. The Honour was given in recognition of Jimmy's services to the British Pteridological Society.



Jimmy was not trained as a scientist; in fact he followed a career in banking, an unpromising platform for someone who was eventually to become known and respected by pteridologists across the world. Of course we all take an interest in a chosen hobby for any one of a thousand reasons! for Jimmy it was his background in Scotland which held the key to ferns. The interest grew and he joined our Society in 1936. Thank goodness he did! Jimmy's persistence was probably the sole factor which ensured its survival through the very difficult period after the Second World War. Relatively few fern activists survived the war and most of those that did were old. An unanimous decision was taken to let the Society fade quietly away. I can just imagine Jimmy haranguing all those old men, refusing to let it die! The outcome of a meeting in the then President's (W B Cranfield) office in London was that if Jimmy wanted to keep the Society going he had to do the bulk of the work. Determined as ever, he set about writing to all the pre-war members putting them in the picture and inviting them to rejoin. Within a very short time he had rebuilt the Society to about 100 members - enough for survival in the short term. Of course Jimmy did not let it rest there and over the next few decades he continued to work tirelessly for the Society, for a long time personally holding all its Offices, excepting that of Editor of the *Fern Gazette*. A full record of his periods of service in the various posts was given in the *Pteridologist* for 1985.

For me, the key to Jimmy's recognition now is the unselfish way he has dedicated so much of his life to ferns, and particularly to our Society, for no personal profit. He did, of course, gain an immense knowledge of all matters relating to ferns, especially the cultivars of our British species, and meet many wonderful people around the world, but it was all done at his own expense, without the resources of a museum, university, or any research grants at his disposal.

I am sure all members will join with me in thanking Jimmy publicly for his enormous efforts on behalf of our Society; the honour is richly deserved. I am also sure that those members who enjoy a glass of malt whisky - or wine - will join with me in drinking to Jimmy's health! Long may he continue to give so generously of his time to the Society.

MARTIN H RICKARD

BOOK REVIEW

HARDY FERNS MICHAEL JEFFERSON-BROWN . Pp 96, 28 Col. plates with additional line drawings, 1992. Ward Lock, London. Price £12.99. ISBN 0-7063-7069-4.

Here we have another book written by a horticulturalist who is not a fern specialist. It is a good introduction to hardy ferns for British gardens, with many concepts of fern garden design new to me. It will be particularly useful as it covers most of the commonly available fern species and cultivars. There are errors in the systematic section, e.g. some cultivars are attributed to the wrong species and some out-of-date names are used. Such details are important to a specialist but I suspect they are of little consequence to the general gardener. The colour photographs are superb but the captions are indifferent. The author, or publishers, have only occasionally made an attempt to name ferns in many of the photographs, and even then have made one or two howlers; for example, a beautiful stand of *Matteuccia struthiopteris* is labelled *Dryopteris filix-mas*! It is a pity the locations of very few photographs are given; many readers might be pleased to know where to see these ferns. John Treasure's beautiful garden at Burford House near Tenbury Wells features strongly and there are even seven photographs taken in my garden here at Leinthall Starks!

At £12.99 this book fills a niche as a reasonably priced, useful guide to garden ferns for the general gardener. It is not really a book for the specialist.

MARTIN H RICKARD

SPLITTERS AND LUMPERS

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The title of this article may possibly appear to be a strange one to some of my readers.

In these days when ferns have become more popular plants again, many enthusiasts are learning to grow their own from spores, and there is a danger that some of them will become "splitters"; that means growers who enthusiastically give special names to ALL their good progeny which show differences, usually quite marginal, from named varieties of the past which are still being grown. This enthusiasm should be held in check, and special names should be considered ONLY if the fern(s) concerned exhibit(s) very exceptional distinctive qualities. They should become "lumpers", which means giving the plants *section* names only, such as *cristatum*, *plumosum*, *divisilobum*, etc. The wide range of existing very good varieties in all sections of variation is such that it is only very, very occasionally that anything exceptionally better is likely to be bred.

In the last century, during what is called the *Victorian Fern Craze*, splitters proliferated! It became, literally, a craze with fern collectors to give special names to every plant they collected or bred which differed in only the slightest degree from the species form. Even the most ragged depauperate specimens were named - they were **name** collectors, not fern collectors. Their ambition was to increase the **number** of named plants in their collections! Nowadays, we don't want that kind of collector - they did immense harm to the fern cult and their activities did much to kill off the *Fern Craze*. In the old fern books we see many examples of their work - even in those of the more reputable writers!

In 1987 I published in the *Pteridologist* my *Classification Table of Fern Variation*. This places into *divisions*, *groups* and *sections* all kinds of variation existing in the British ferns and gives a useful framework into which to fit the many very similar varieties which are grown today, many of them old varieties which have lost their name tags and others newly bred by enthusiastic breeders.

A closely allied problem existing today is a practice prevalent in some commercial establishments, and in the past with some amateur breeders - labelling their sporelings from named varieties with the names of the parents. This has led to a lot of confusion in variety nomenclature. When a fern varies from the normal species form its progeny will, with some exceptions which breed true to the parental form, include a range of forms, varying from that of the species itself and on through the variety form to some plants which are very distinct improvements on it. These plants are so very different from the parent that they cannot possibly be labelled with the same name. Unless they are sufficiently distinctive to be given names of their own they should be called 'Progeny of - ', or (- group).

A good example from the past is Druery's first sowing of spores from *Polystichum setiferum* 'Plumosum Bevis'. About 100 sporelings resulted, among them three which were of superlative quality - 'Plumosum Drueryii', 'Plumosum Gracillimum' and 'Plumosum Gracillimum Cristulatum'. Many of the plants were little better than, or no improvement on, the parent but all or most of them got into the hands of other growers and were labelled 'Drueryii'. Consequently, today there are many quite different plants masquerading under the name, some of them quite difficult to distinguish from 'Plumosum Bevis' itself, others very good varieties although not up to the standard of the true 'Plumosum Drueryii'. I possessed quite a few of them - some now grace Martin Rickard's garden, where they receive the care I can no longer give them.

BIOLOGICAL CONTROL OF BRACKEN IN THE U.K.

SIMON V. FOWLER, International Institute of Biological Control, Silwood Park, Ascot SL5 7TA, U.K.

For several years, we have been conducting research on the possibility of introducing foreign insects to help to control bracken. This method of biological control is relatively novel for the U.K., despite being successfully used in many other parts of the world. Some apprehension at the possible introduction of foreign insects for bracken control in the U.K. is therefore not surprising, particularly from members of the public with a keen interest in pteridological matters. Many members of the British Pteridological Society may have seen brief news articles in the press concerning this biological control programme but may not have had access to more detailed publications in scientific journals and conference proceedings. This article is intended to explain what classical biological control involves and why it is a safe and sensible approach to the bracken problem, but first, why is bracken a problem?

The bracken problem in the U.K.

Estimates of the land area covered by bracken in the U.K. range from 3000-6000 square kilometres, with the most serious infestations in upland regions in the west and north. In some areas bracken is still spreading and the changes in land use and deforestation that may be responsible for the increased invasiveness of bracken have been widely documented. Bracken can be a weed for a variety of reasons. Losses to upland agriculture are caused by poisoning after consumption of bracken by stock and by the loss of grazing land to bracken encroachment. The heather moorland vital for grouse management is under threat from bracken in many areas and bracken also provides shelter for the sheep ticks that transmit louping ill virus to both grouse chicks and sheep. Sheep ticks are also implicated in the transmission of Lyme disease to a range of animals including man. More direct effects on man may also exist from the carcinogens identified in bracken foliage and spores. It has been suggested that higher levels of stomach cancer in some areas of the U.K. may be linked to drinking water originating from bracken covered slopes or to a generally high level of exposure to bracken. Bracken can also be a weed of amenity and conservation areas, making access difficult or displacing other more desirable plant species. Existing efforts to control bracken largely consist of ploughing, regular cutting, crushing or the use of herbicides, especially asulam. However, all these methods are expensive and require safe access to the land by agricultural machinery. Bracken often infests steep or rocky slopes making aerial application of herbicides the only current option for control - costing around £100/hectare. Without follow up treatments, re-spraying is necessary within 5 years. Indeed, asulam can be so effective at preventing new frond growth of bracken in the year after application that large areas of bare bracken litter are exposed. Rehabilitation of sites need to be a very important part of conventional bracken control programmes and also adds to the cost, particularly if fencing is needed to prevent access by grazing animals. As well as the expense, any large scale use of herbicide for bracken control raises environmental concerns.

Classical biological control of weeds

Classical biological control of weeds uses introduced specialist herbivores, such as insects or plant pathogens, to reduce the vigour of an undesirable plant species. This is in contrast to the augmentative method of biological control where the effect of an existing native herbivore or pathogen is increased, usually by some form of mass release. An example of the augmentative approach, relevant to bracken, is the work at the Strathclyde University on the possibility of formulating pathogens of bracken in the U.K. as a mycoherbicide spray.

The ecological basis of classical weed biocontrol is that the abundance of many plants in the natural environment is controlled by natural enemies, and that many insect herbivores and plant pathogens are extremely host specific. Dutch elm disease provides a familiar example among pathogens. Note here that eradication of a target weed by a host-specific herbivore is neither ecologically possible nor usually desirable. In a classical weed biological control programme, if the weed declines in abundance the specialist herbivores will inevitably also decline because of a decrease in suitable food.

The first major success in weed biocontrol was the introduction of the moth, *Cactoblastis cactorum*, into Australia which resulted in a reduction in infestation of prickly pear cacti, *Opuntia* species, over 60 million acres during the 1920's. Since this early success, there have been at least 729 weed biocontrol programmes using invertebrates or fungi, against 140 weed species worldwide. One analysis concluded that 39% of programmes had led to substantial control of the target weed. Most biological control programmes to date have involved the introduction of highly specific insect natural enemies of the weed, but recently host-specific pathogens have been used to control weeds successfully. Classical biological control can combine environmentally friendly weed suppression with excellent benefit/cost ratios.

Stages in a classical biocontrol programme

Background work

Initial research should ensure that sufficient is known about taxonomy and biology of the weed, and that the plant represents a suitable target for classical biocontrol from economic and environmental/ecological viewpoints. The study of the native U.K. fauna attacking bracken was particularly important because the plant is itself a native. Classical biological control is usually aimed at alien weeds, but native weeds can be targets if appropriate agents can be found in other parts of the world. Knowledge of the economic impact of the weed (negative and positive) in the U.K. is required to justify the initiation of a biocontrol programme on a purely cost/benefit basis. For example, losses to upland agriculture in England and Wales due to bracken have been estimated at £3-9m per annum. The total estimated cost of the research already conducted and still required to lead to a full field release of one agent is £0.5m. Thus the total cost of the biocontrol programme for bracken to date only represents 6-20% of the annual losses caused by bracken to farmers in England and Wales, disregarding the other impacts of bracken which are harder to quantify economically. Obviously, the impact of bracken on natural or semi-natural environments, particularly land valued for conservation or recreation, is also important. Care is needed because conflicts of interest may be revealed by any of these studies. Economic uses for the target weed may exist, although for bracken these consist only of minor use as bedding. The environmental consequences of the reduction of weed infestation may be more serious, particularly if control is rapidly achieved. Classical biological control of bracken will be slow acting and highly unlikely to eliminate bracken rapidly from any areas. Following biological control, native plants will be able to re-colonise the more open bracken stands and follow any slowly retreating edges of bracken stands. For bracken biocontrol, the most serious issues are whether the native flora and fauna that utilise bracken stands will be affected and the need to ensure that there is no risk to any native or ornamental plants related to bracken.

Field surveys

Despite the near-global range of bracken, suitable areas for obtaining potential biocontrol agents for bracken were restricted by the need to match the climate and the taxonomic type of bracken to that in the U.K. The only country fulfilling these criteria, and having a bracken fauna distinct from that in the U.K., was South Africa. Field surveys in South Africa revealed a range of possible agents, but two moths were particularly promising, a pyralid (*Panotima* and *angularis*) and a noctuid (*Conservula cinisigna*). *Panotima* has

stem-boring larvae that can cause an entire frond to collapse. *Conservula* larvae consume bracken foliage early in the season. Both species are substantially different from the existing U.K. bracken fauna, reducing the chance of native U.K. parasites and predators targeting the newly released moth larvae. Rearing the stem-borer in quarantine proved difficult, so attention centred initially on *Conservula* (see photos. opp. p. 156).

Host specificity testing

Establishing the host specificity of potential agents is the most important time-consuming part of any weed biocontrol programme. In the bracken programme 71 plant species were tested. These species were selected using internationally accepted criteria and concentrated on plants closely related to the target weed occurring in the U.K. as natives, crops or ornamentals. There are no native ferns in the same family as bracken, but we still attempted to test at least one species from each family of ferns present in the U.K., as well as a range of crops and ornamental species. The pteridophyte species tested against *Conservula* are given in Table 1, including species tested in the U.K. and in South Africa.

Table 1 - Pteridophytes used in starvation tests with *Conservula cinisigna* larvae

	Total No. of larvae tested		Total No. of larvae tested
LYCOPODIACEAE		CRYPTOGRAMMACEAE	
<i>Huperzia selago</i>	57	<i>Cryptogramma crista</i>	5
<i>Lycopodium clavatum</i>	25	THELYPTERIDACEAE	
SELAGINELLACEAE		<i>Thelypteris palustris</i>	50
<i>Selaginella kraussiana</i>	65	<i>Amauropelta bergiana</i>	30
SCHIZAEACEAE		ASPLENIACEAE	
<i>Mohria caffrorum</i>	30	<i>Phyllitis scolopendrium</i>	80
		<i>Asplenium aethiopicum</i>	30
HYPOLEPIDACEAE		ATHYRIACEAE	
<i>Pteridium aquilinum aquilinum</i>	221	<i>Athyrium filix-femina</i>	165
<i>Hypolepis sparsisora</i>	30	<i>Onoclea sensibilis</i>	51
PTERIDACEAE		<i>Cystopteris fragilis</i>	25
<i>Pteris cretica</i>	60	<i>Matteuccia struthiopteris</i>	50
<i>P. dentata</i>	30	DRYOPTERIDACEAE	
OPHIOGLOSSACEAE		<i>Dryopteris filix-mas</i>	100
<i>Ophioglossum vulgatum</i>	35	<i>D. inaequalis</i>	30
ADIANTACEAE		<i>Polystichum aculeatum</i>	40
<i>Adiantum pedatum</i>	80	<i>P. setiferum</i>	65
<i>A. poiretii</i>	25	<i>P. lucidum</i>	30
<i>Pellaea rotundifolia</i>	70	<i>Gymnocarpium dryopteris</i>	60
<i>P. viridis</i>	35	<i>Rumohra adiantiformis</i>	30
<i>Cheilanthes hirta</i>	20	BLECHNACEAE	
DAVALLIACEAE		<i>Blechnum spicant</i>	61
<i>Nephrolepis cordifolia</i>	30	POLYPODIACEAE	
		<i>Polypodium vulgare</i>	183
		OSMUNDACEAE	
		<i>Osmunda regalis</i>	87

As usual, the host range testing of larvae of *Conservula* began with simple no-choice tests where first instar larvae were offered one of the test plant species and given the basic choice of feeding or starving to death. These starvation tests are highly conservative and most host specific insect herbivores widen their apparent host range under these conditions. Evidence of this can be obtained not only from biocontrol screening work but also from many ecological studies of native insect herbivores all over the world. So some abnormal feeding on non-host plants is expected in these simple no-choice tests. With *Conservula*, occasional survival of larvae occurred beyond the first instar on several test plants. The tests were expanded and continued, showing that full development to adult moths only occurred with larvae fed on bracken. With *Panotoma* no larvae survived beyond the first instar on any test plants other than bracken so further

testing was deemed unnecessary. These results indicate that both species are fully specific to bracken, confirming field observations in South Africa in which larvae were never found on other fern species growing nearby to bracken. Another concern is that even if the agents are specific now, will they alter their food preferences when released into a new environment? Although we are all too familiar with garden pests that can feed on many plants, in fact most insect herbivores are so specialised that evolutionary change to include additional plant species in their diet is extremely rare. In over 90 years of weed biocontrol, providing the appropriate host range tests have been conducted, there have never been any examples of biocontrol agents unexpectedly attacking non-target plants. When we applied for permission to release *Conservula*, English Nature (as the Nature Conservancy Council) accepted that the results were sufficient evidence for host specificity. However the Interim Advisory Committee on Introductions (Department of Environment) did request that some limited further host range screening be conducted within secure field cages, revealing a degree of caution that in our view reflects the novelty of weed biocontrol to the U.K. rather than any genuine risk.

Current status of the classical biocontrol programme against bracken

Permission to release the first agent, *Conservula*, into secure field cages, under a set of conditions, has been given by the Department of Environment (DoE) and the Ministry of Agriculture, Fisheries and Food (MAFF). The conditions attached to the release are (i) that we ensure that imported *Conservula* are pathogen free (ii) that *Conservula* larvae are tested against several additional non-native genera of ferns commercially available in the U.K. (iii) the design of the secure field cages is agreed with MAFF and DoE, and (iv) 36 species of crop/ornamental plants are exposed to *Conservula* in the field cages.

The cages will allow detailed monitoring of the impact of *Conservula* larvae on bracken and some of its existing U.K. fauna under semi-natural conditions. The resulting data will be used to model and predict the wider impact of *Conservula* on bracken in the U.K. The impact of *Conservula* in conjunction with other control methods will also be investigated, particularly cutting and spray application of asulam. An integrated approach to bracken control is likely to be more successful than the control attempts of the past, particularly given the vigour and invasiveness of bracken. We expect that the impact of introduced biological agents on bracken will be insufficient to achieve control independently, but by reducing the carbohydrate reserves in the rhizomes over large areas of bracken, more successful local control may be possible using the standard methods of cutting or herbicide application. After classical biological control, bracken would still remain in large quantities in the U.K. countryside where it had not been subjected to a range of control measures. Of course, if frond density were reduced in some of the large monocultures of bracken as a result of biocontrol, this would almost certainly improve the environment for nearly all the animals and plants that are currently found associated with bracken in the U.K. One issue that will need to be resolved is the recent claim that two additional subspecies of bracken exist in the U.K. If additional rarer bracken taxa do exist, the possibility of them being harmed by a biocontrol agent needs to be weighed against the potential benefits of bracken biocontrol by the DoE before deciding whether to allow a full field release.

Monitoring the release, establishment and potential impact of *Conservula* on bracken will be a vital part of any continued programme, and should make full use of the existing knowledge of bracken biology and the large number of entomologists and botanists, amateur and professional, in the U.K. Any release of *Conservula* in the U.K. should become the best documented and studied introduction of a herbivorous insect for biological control to date. At this stage, final research towards the introduction of the second agent, *Panotima*, could also be initiated.



Fig. 1. *Conservula* larva



Fig. 2. *Conservula cinisigna*
- adult moth on bracken crozier
- wing span 1.5 inches (3 cm)



Fig. 1. Trays of 180 plugs containing sporelings on the propagating table



Cast iron Coalbrookdale 'Fern and Blackberry' seat



Figs. 1 & 2 Within the conservatory at Ampthill.

Further information on bracken and the biocontrol programme can be obtained from Dr S.V. Fowler or from recent publications (and references therein):

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- BURGE, M.N. & KIRKWOOD, R.C. 1992. The control of bracken *Critical Reviews in Biotechnology* 12: 299-333.
- LAWTON, J.H. 1988. Biological control of bracken in Britain: constraints and opportunities *Philosophical Transactions of the Royal Society of London B* 318: 335-355
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RESPONSE TO SIMON FOWLER'S ARTICLE - AN ALTERNATIVE VIEW

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One can accept the assurances offered by Dr Fowler regarding the possible use of the moth *Conservula* to attack Bracken, and yet ask if releasing it would be a sensible thing to do.

Bracken is unquestionably a pest species when it invades valuable farm land, and it will remain one, though on a smaller scale, as 'set-aside' proceeds (There must be quite a number of farmers who will happily accept compensation for setting aside land where Bracken is troublesome). Away from farmland, Bracken is often welcome, aesthetically or ecologically: on southern coasts it provides shade for bluebells and other desirable plants where woodland has disappeared, and its scenic contribution on our fellsides has been welcomed from Dorothy Wordsworth's day to our own. There is no case for controlling it there; we have too many upland sheep as it is, and do not need to make space for more.

You cannot control a moth's travels, tell it where to go and which plants to eat. Innate cussedness (which Dr Fowler has apparently not assessed) will surely mean that *Conservula* would leave farm Bracken alone and chew away at the aesthetically desirable colonies. This assumes, of course, that Dr Fowler is correct in his unprovable assumption that the moths will confine themselves to limiting Bracken growth, and will not emulate *Cactoblastis* and decimate it, country-wide.

Far better, it seems to me, to concentrate on developing a Bracken-specific chemical control, or even to continue with asulam, strictly regulated by Government dictate rather than by the cost of using it. I hope the Society will say so, loudly.

COMMERCIAL FERN GROWING IN HOLLAND: THE EXAMPLE OF ROYAL LEMKES & SONS*

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The firm of Lemkes and Son, at Alphen aan den Rijn is one of the major fern growers in the Netherlands. It is at present managed by J.J.C. (Hans) Lemkes, great-grandson of H.J. Lemkes who founded the nursery in 1882. On the occasion of its century Lemkes received the designation 'Royal', an honour given by Her Majesty Queen Juliana to prominent and successful national companies which are 100 years old. The annual turnover of ferns is ten million plants with a value of Dfl. 3,500,000 (\$US c.2,000,000). Plants are exported throughout the European Community and to many countries abroad including Central America, Japan, South Africa, Taiwan and the U.S.A.

The company offers a wide range of ferns for the temperate garden and the catalogue produced for the *Floriade* in 1982 illustrates 75 of these in colour. House plants like *Asplenium nidus*, *Platynerium angolense*, *P. grande* and *Adiantum cuneatum* 'Brilliantelse' are also grown, the latter variety being so popular that 150,000 plants are produced annually. One plant of *Adiantum* can produce ten grammes of spores per year - enough to produce about 100,000 plants for sale.

*An abbreviated version of a presentation given by the author at the B.P.S. Symposium, July 1991

The collection and storage of spores is an important task. They are stored in the dark at a temperature of 6°C and under such conditions most species can remain viable for five years. The substrate used to grow prothalli is moss peat. At least 250 boxes (30 x 54 cm) are sown with spores weekly, sometimes as many as 500. The amount of spores sown per box is measured by weight, depending on the species it can be from 10 milligrams to 2 grams and is shaken onto the substrate through a sieve. The planter wears a mask to prevent inhalation of the spores. The boxes are kept in the greenhouse under 20 hours of light (2800 lux) per day, at a relative humidity of 95% and a temperature of 23°C.

Detailed records are kept of all spore gatherings, sowings and, later, plantings, on computer. Observations about the rate of growth, attractive varieties and sales figures are also put onto the database for future programme planning.

The time between sowing and the production of young sporophytes ready for their next planting varies from ten weeks to 18 weeks. Apogamous species are fastest. Small clumps of sporelings are planted in seedling trays which hold 84 or 180 unit plugs. Planting out requires dexterity and is done in shifts; hygienic handling is essential. Mostly women are employed for this purpose, on a part-time basis; a rapid planter handles 1500-2000 plants per hour. The propagating trays are filled by machine, at a rate of 250 per hour, the soil mix being one of peat (obtained from Finland), artificial fertilizer and 20% perlite. Most of the young plants are sold in these trays, thereby requiring only a single transplanting. Planted trays are placed on aluminium rails on a propagating table (108 trays per table) (see photo. opp. p. 156). Under the trays are tubes for feeding CO₂ and heating tubes are placed beneath the tables themselves. The tables are really water-tight trays and plants can be irrigated with water (maintained at 21°C. and containing liquid food) on a flooding and ebbing system. Each table holds 800 litres of water when flooded. Returned water is aerated and the pH checked to maintain 5.5 to 6.0. Oxygen and nutrient content and pH is monitored electronically. The nutrients contain enough nitrogen, phosphorus, potassium, calcium, magnesium and sulphur with the following trace elements: iron, manganese, boron, copper, zinc and molybdenum. In addition some extracts of algae are added to give unknown microelements. Over the table is a 'tent' of plastic to give the plants extra moisture during the first 3-4 weeks; after that they are 'hardened off' by removing the plastic. Tables are on rollers and can be compacted or parted to form a gangway when plants have to be tended. In this way the maximum area in the greenhouse is covered by the tables and plants.

In the open greenhouse the day temperature is kept at 20°C., dropped to 19°C. at night, and the relative humidity is kept between 75-85%. These conditions are maintained by large suspended fan units in which the air is sucked in at the bottom and vented horizontally at the top. Into the air current water is atomised at high pressure (30 atm/bar) to maintain humidity and in summer air intake can be cooled by as much as 4-5°C. if necessary. Intake from the outside air is filtered for insects using gauze. This will reduce the actual area of the intake and flow of fresh cool air.

To overcome this the area of gauze is proportionately greater than the window area.

Another parameter monitored is carbon dioxide content of the greenhouse air and added CO₂ (from pure gas cylinders) leads to an increase in assimilation, and thus growth, of the plants. CO₂ content of the air is measured by a selector at eight different points in the greenhouse and valves are automatically opened to allow in the correct amount of gas. Gas levels are recorded daily to check against growth rates.

From mid-September to mid-May natural day-length is increased to 18hrs/day and the lights switched on if the outside light level is below 2000 lux. Lemkes irradiates with SON lamps (high-pressure sodium lamps) which give 2500 lux per sq.m.

If general nursery hygiene is strict pests can be kept to a minimum. In an operation where peat and other decaying plant remains are common *Sciara* flies, generally known as fungus gnats, which have a short and rapid life-cycle, can be a major pest; they can enter when doors are open, or on clothing of operators. At Lemkes chemical insecticides are not used in the nursery but these gnats can be caught on glue tubes fixed in the ridge apex of the greenhouse. Sciarids are particularly a pest of prothalli on which the small maggots often feed. Those houses or frames containing the growing prothalli are maintained at a higher air-pressure so that airflow and air currents are always moving **out** of the container (the so-called vacuum system), and flying insects cannot fly in against the current.

Propagation by spore is the most cost-effective method for commercial growers but there are occasions when one wants to reproduce a variety that market research shows is a good seller. The best way to achieve this is by tissue culture where very small amounts of actively growing tissue is grown on gelatin plates. Lemkes has only a small laboratory for such activity and when necessary, contracts out large-scale requirements. Tissue culture is needed or is best for: sterile species/hybrids, varieties which are not obtained from spores as "true to type", species badly affected by fungi, and new varieties where results are needed quickly for a marketing drive. The Boston Fern (*Nephrolepis*) cultivars are particularly well suited to this kind of propagation.

Lemkes exports considerable quantities of young fern plants in boxes containing six trays, each with 180 plants - 1080 plants which weigh about 13 kg. They have given much thought to find a system which ensures safe transport of the product at minimum freight charges. For air freight, in which a kilo of lead is charged at the same rate as a kilo of plants, an optimum weight/volume ratio package has been designed. Temperature changes are the main problem and plants are well-insulated. The package now used ensures the plants arrive at the customer's door in good condition and they can be unpacked and, whilst still in their inner packing, can be placed in a nursery to acclimatise before their ultimate re-potting.

CAST IRON FERN SEATS

MARTIN H RICKARD, The Old Rectory, Leinthall Starks, Ludlow, Shrops. SY8 2HP.

Through the Victorian period and the early years of this century ferns touched on many aspects of everyday life. Recently, the *Pteridologist* has featured two articles on plates decorated with ferns, but many other items featured fern motifs, including garden seats.

The majority of fern seats were made by the Coalbrookdale foundry near Ironbridge in Shropshire. I do not have precise dates but most were probably made from 1860 to 1900. The commonest design is 'Fern and Blackberry' (see phot. opp. p.157). The ferns are rather stylised but there cannot be much doubt that the species depicted is *Pteridium aquilinum* or Bracken. The blackberries are confined to small diamond-shaped boxes along the top of the seat back. The Coalbrookdale foundry did not make only one type of 'Fern and Blackberry', there are, in fact, 30 or more different versions. Options available were single seats, doubles, 3' 5" and 4' 9" long, and trebles, 6' long. Some or all of the longer models have a decorative frieze of cast iron along the front, under the seat. Most models were available with a pine-wood seat, an oak-wood seat or an iron seat. Ex-factory seats seem to have only been available in green, chocolate or bronzed - apparently never white. Curiously, it is rare to see one of these seats in any colour other than white today. While quite rare, these seats can be found in antique shops fairly easily, priced at anything from £400 to £1400, depending on dealer and condition. Don't be put off though, one of these in your garden is not just a museum piece, it is unbelievably comfortable!

Two other fern designs were made at Coalbrookdale; today these are very rare. I have

only ever seen pictures of these models. 'Osmunda Fern' is a beautiful seat (see Fig. 1), made up with panels of typical *Osmunda regalis* fronds; it does not look as comfortable as 'Fern and Blackberry'. This was available as a single, double, 3' 4" and 4' 11" long, and treble 6' 5" long. Seat and colour options were the same as 'Fern and Blackberry'.

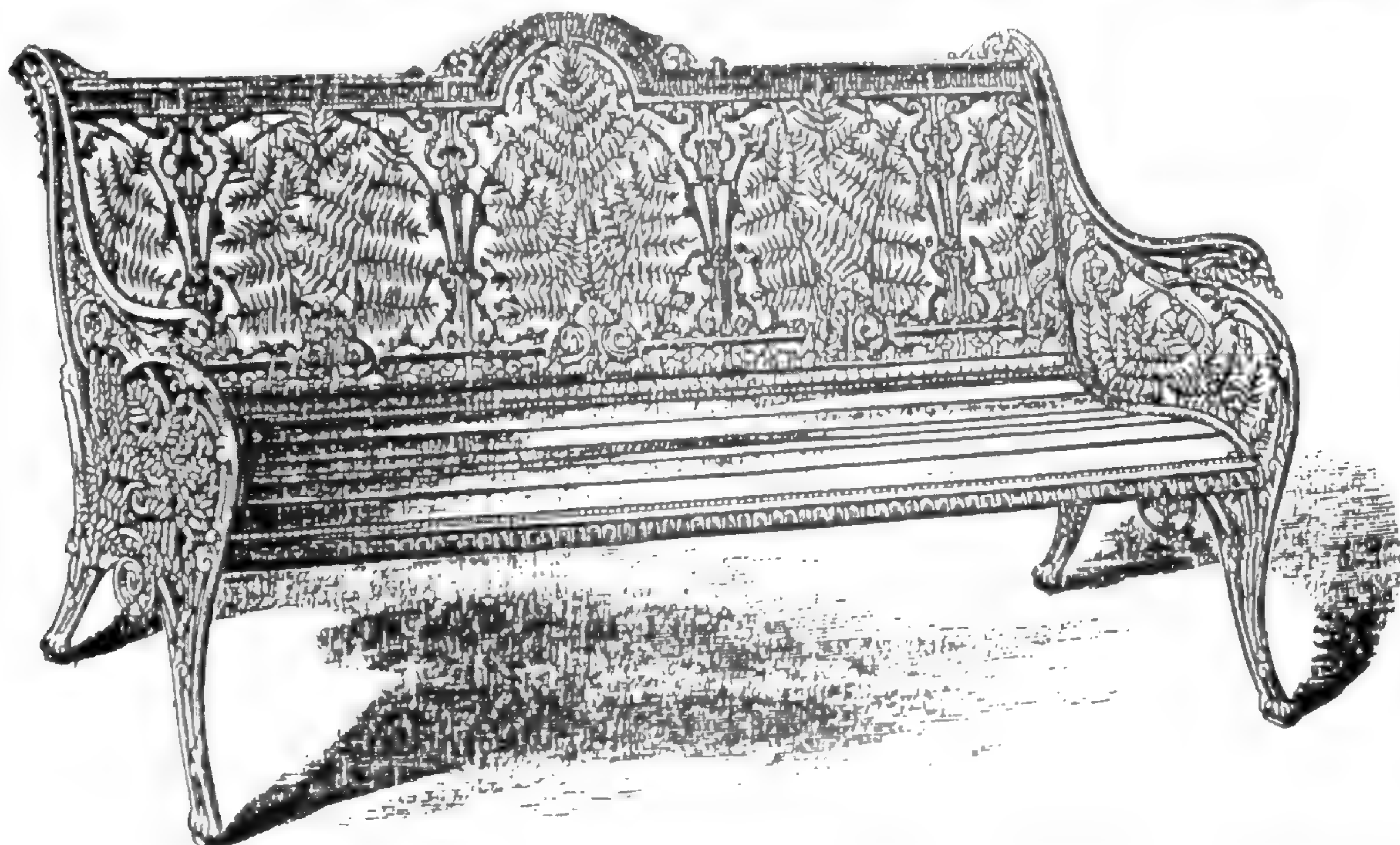


Fig. 1. Osmunda Fern

The final design is by far the most beautiful, it is called 'Osmunda regalis'. Although I have only seen the company engraving it is obviously a work of art (Fig. 2). The back panel has no partitions and is one incredible collage of osmunda fronds with strands of, what look like, foxgloves. This model was available with small shelves which fixed to the arms. Versions offered are similar to the other designs, except no single seater appears to have been made.

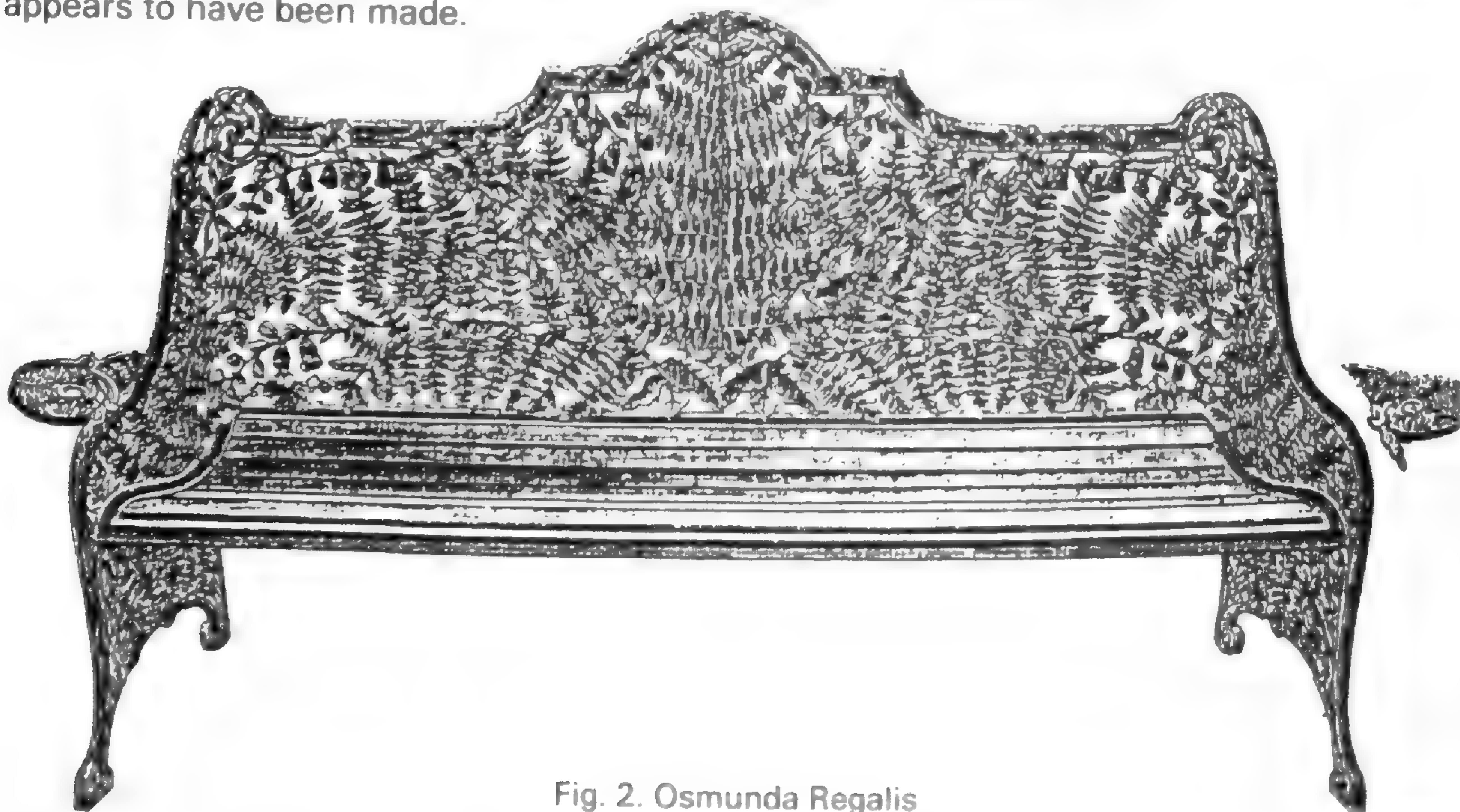


Fig. 2. Osmunda Regalis

Cast iron manufactured at Coalbrookdale is supposed to carry the Coalbrookdale mark - a modified diamond about 4 cm high. In fact, many seats which look to be genuine Coalbrookdale do not have a mark, so this is not an infallible guide to authenticity. Forgeries complicate the issue, I have seen one probable cast iron forgery but usually modern copies are made of aluminium or some other very lightweight alloy. If you can lift it, it is probably not cast iron.

(Figs. 1 and 2 are reproduced with the kind permission of the Ironbridge Gorge Museum Trust)

SPACE AND TIME ECONOMY IN FERNING

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Two hours a week and a minute sandy garden are the cause of much anguish and frustration. With imagination, thought and, ideally but not necessarily, a conservatory, these drawbacks can, however, be overcome to successfully grow many different ferns from all over the world.

A conservatory obviously enables the growth of a much wider variety of ferns, as well as being an ideal place for germinating spore and the growing of sporelings. Also it gives considerable joy in winter months when garden plants are dormant; it is therefore an invaluable asset if the space can be spared.

Within the conservatory (see Figs 1 and 2 opp. p. 157) we have benches both sides with shelves above; benches are base lined with builder's plastic sheeting with upturned lip edge, and onto this is put an inch (2.5 cm) or so of builders sand which is then covered by capillary matting. The sand can retain a considerable amount of water and keep the matting moist for long periods. Gravel trays are used extensively on all shelves, 22 inch (50 cm) square trays on lower shelves and oblong 42 x 15 inch (105 x 38 cm) trays on upper shelves; these also have capillary matting in the bottom for even distribution of moisture. These trays are excellent for holding many pots, perhaps 40 spore pots on one tray.

Benches and trays prepared in this manner make watering easier as the whole bench or tray can be watered directly, saving time watering each pot individually. By using peat based compost the plants will take up moisture from below as required.

When it comes to being away from home for a few days, especially in summer months, plants can easily dry out quickly; an extra soaking of the bench will eliminate any short term risk of drought, or whether someone else, however good their intentions, remembers to do it right. The humidity created from the benches can be considered an extra bonus to the well-being of the plants.

As we all know, ferns will grow within the home, but how many suitable places are there, even with artificial light and humidity creating devices? Even the most durable and tolerant of ferns will eventually succumb to the hostile environment unless positioned in one of the few best places.

So with the facility of a conservatory many of the less suitable places can be brought alive with ferns, changing them periodically back to the conservatory to rejuvenate and return to their former growing glory. At this point it may be said that many unlikely ferns, such as male fern, look and last well in the home, so there is plenty of choice.

Watering in our conservatory is with rain water collected in three butts from its own roof. Relative humidity is usually around 80% in summer, time controlled artificial lighting by fluorescent tubes enhances daylight in such places as under benches.

Shading in the summer months is provided by old venetian blind slats, one slat every 3 feet (95 cm) or so, screwed to the roof rafters in one direction and others slipped between in the opposite direction. This method enables different parts to be shaded heavily or lightly as required by just slipping in more or fewer slats. These can be removed in minutes on the arrival of shorter days and decreasing sun.

Winter heating in the conservatory is provided by a small gas boiler which is set to maintain a minimum temperature of 55°F (12°C), this being a temperature whereby most plants will continue to grow slowly and therefore still provide interest and activity, even though it may be well below freezing outside; the boiler, by the way is not a costly item to run.

Pests cannot be completely non-existent in such an environment, but if new additions are thoroughly checked and a watchful eye kept, no pest should become a problem.

Corner cutting, regrettably, is practised to save time although no problems have directly resulted to date!

Beyond the conservatory there is a small unit used mainly for storing plants. Spores don't give you the desired three or four of the required fern; one gets none, millions, loads of gatecrashers or various combinations. So there is an odd-ball lot in here, some waiting for a place to be found in the garden sometime, and others that would find the garden too cold, such as tree-ferns and woodwardias. A small electric heater keeps this area just frost free in winter. It has a similar arrangement with trays decked on shelves.

Our minute sandy garden has, in most parts where there are ferns, had builder's plastic sheeting laid to a depth of 12 to 15 inches (30 to 38 cm), to retain moisture. The sheet is punctured with suitably placed drainage holes to prevent the soil becoming too waterlogged. The hose pipe, even if not banned, cannot compete with the plastic sheet which seems, so far, to work very well.

Contentment for me cannot be found in a few ferns and at the risk of being frowned upon by the school that believes the true beauty of an individual plant may be lost when crowded out by others, our ferns have been planted much too closely, in order to have as many as possible. There is no such thing as too many and a place can be found somewhere for more. Most, at present, are in a relatively juvenile state so probably some will need relocating later, but many ideas float around, its just a time problem.

It is hoped this story may inspire others with small awkward gardens to step back and think again what can be done, as the delights are indescribable from that first crozier pushing through in the spring to the green carpet in the spore pot.

I would like to take this opportunity to thank the BPS and all those pteridologists who have given their time and advice to Linda, Trish and myself over the last two and a half years.

SHORTER NOTE

Remembering Reg

The Master has gone

In latter months, slowly waning
Like a setting sun

Yet, his ferns do raise
Their croziers firmly still

And proudly spread their
Fronds as was his will

The sori shed their spore
To rest and flourish ever

Would he have wished it
Other, oh no - never

And like the dawn the ferns

Will come, ere sun or rain

We should not mourn
Through them he joins us once again
His legacy is everywhere
Abundant - and will stay

For they will be here for many a day
And so the Master has gone

Ah yes, sadly, in a way
But just try telling that

To my *Asplenium Scolopendrium*
'Laceratum Kaye'

RAY SMITH

THE ONE THAT GOT AWAY - THE CRANFIELD COLLECTION

MARTIN H RICKARD, *The Old Rectory, Leinthall Starks, Ludlow, Shrops SY8 2HP*

I don't think too many people would disagree that the ferns accumulated by Reginald Kaye at his Silverdale Nursery make up the most important collection of cultivars of our British ferns in existence today. Over the years from the 1920s to the 1990s Reg raised many new cultivars from spore and bought collections from many of the old pioneer growers, saving many of the classic cultivars from banishment to oblivion. Over this period notable acquisitions to the Silverdale garden include ferns from Percy Greenfield, Robert Whiteside, Mr Penny and John Stormonth (Kaye, 1991). Reg also acquired individual plants from many other sources right up to the time of his death in August 1992.

Sadly, however, the big one got away. That big one was the collection built up by William Bathgate Cranfield over many years from the beginning of this century until his death in 1948. Cranfield was President of the British Pteridological Society from 1920 until 1948. At some time, probably in the late 1930s or 1940s, Cranfield offered his collection to Reg for £500 (Kaye, 1991); an enormous sum of money, roughly equivalent to the cost of a semi-detached three bedroomed house in London before the war. Such a sum was out of the question to Reg, or anyone else, so the collection was willed to the Royal Horticultural Society's garden at Wisley. The story of its subsequent demise has been told several times recently by Jimmy Dyce (eg Dyce, 1990), and is reinvestigated in this issue (Rickard, 1993). In short, only a relatively small number of plants were actually collected from Cranfield's garden at Enfield; those which remained were offered to local gardeners and the rest were flame-gunned so the ground could be cleared for vegetables. It is a tantalising thought that some treasures may still exist in the vicinity anonymously tucked away in private gardens! The loss of the bulk of this enormous collection was clearly a severe blow to the fern cult in this country. If only Reg had been able to buy it!

Cranfield's collection was frequently referred to in the early volumes of *The British Fern Gazette*. Therefore, from this source alone we have quite a good idea which ferns he grew, how he grew them and the appearance of his garden.

Cranfield was a relatively rich man and was able to buy any collections that came on the market, perhaps out-bidding other growers? Or perhaps he was given first refusal? Either way, most of the better collections ended up at Enfield. Notable acquisitions were the Moly collection (pre-1910), the Henwood collection (complete except for a few distributed as souvenirs in 1937), as well as plants from Harris at Bristol (originally in the A M Jones collection), T Bolton of Warton, Dr Stansfield, C T Druery and, almost certainly, C B Green. It was always tempting to think that Cranfield was given, or bought, Druery's collection, but I have only recently found proof, thanks to Peter Barnes of Wisley drawing my attention to Druery's obituary in *The Garden*. There Cranfield states, "While his death creates a gap which no one can fill, it is some source of consolation that his entire collection of British Ferns and numerous notes and writings have passed into my possession, which will, I hope, enable me to continue the work he had followed with such enthusiasm and success during the latter part of his life" (Cranfield, 1917).

In addition to acquiring so many collections, it must not be forgotten that Cranfield also did a tremendous amount of spore sowing, raising many first class cultivars of his own.

The garden at Enfield extended to about 4 acres. Many of the ferns were planted in a series of bays, each was 21 feet wide by 27 feet from back to front and enclosed by a privet hedge. These bays were set up in 1912 when Cranfield cleared a strip of land to the north of his spinney. By the late 1940s Jimmy Dyce tells me that the hedges had been replaced by low walls. The bays were under the shelter of lofty trees bordering

a woodland area. Each bay consisted of a short path, surrounded horse-shoe fashion, by wide sloping beds, here and there furnished with stepping stones. There were seven of these bays, five devoted almost exclusively to cultivars of *Polystichum setiferum*, one to *Asplenium scolopendrium* and one to *Athyrium filix-femina*. Behind the bays Cranfield kept seedlings for trial.

Nearby, in a spinney, a wide range of ferns were grown, while in another site, by a cottage, cultivars of *Dryopteris* were concentrated. Other more treasured items, including the small aspleniums, were kept in a greenhouse. Because polypodies grow to greater perfection with protection they were grown in a cold frame in his 'orchard'. Another frame was devoted to dwarfs - mainly *Asplenium scolopendrium*, another to blechnums and yet another to other *Asplenium scolopendrium* varieties.

Thanks to the recent rediscovery of a collection of the notebooks at the Royal Horticultural Society Gardens at Wisley, it is now possible to build up a complete picture of the treasures in Cranfield's fern collection at around 1915.

This collection includes five notebooks, surprisingly in Druery's handwriting, describing Cranfield's collection. In *The British Fern Gazette*, 1915, Druery reveals he was invited to Enfield by Cranfield to take stock of his collection of British Fern varieties, with a view to their systematic classification and proper naming. Druery comments that he imagines the collection to be practically the most representative, the choicest and most up-to-date of those in existence at the time, presumably the summer of 1915. It is therefore logical that notebooks in Druery's handwriting listing all Cranfield's ferns should exist. One of these notebooks gives locations of ferns in a garden, obviously Cranfield's. I believe the other four notebooks, which are smaller, simple alphabetical lists, were written at the same time.

The four smaller notebooks are well organised, each dedicated to a single group, ie. *Lastrea* (*Dryopteris*, *Oreopteris* etc.), *Athyrium filix-femina*, *Polypodium vulgare*, and *Polystichum*. There is no book listing all the aspleniums.

For records of aspleniums and other genera we have to rely on the larger notebook which gives the composite record of the entire collection and its distribution in Cranfield's garden at Enfield. These lists describe his collection before he acquired Druery's ferns. Subsequently Cranfield updated the notebooks at various times with additions. It is easy to distinguish Cranfield's writing from Druery's. Druery's writing is very neat and usually easily interpreted, unlike Cranfield's which is grotesque and very difficult to read - even if it does have the advantage of being very easily recognised!

From all these books we therefore have a good record of Cranfield's collection. The list below summarises the highlights among the hardy ferns in 1915 when Druery did his inventory; tender ferns are another story!

Asplenium adiantum-nigrum - only two notable cultivars: 'Caudifolium' and 'Grandiceps'.

Asplenium obovatum - 'Microdon' - a hybrid, not a cultivar.

Asplenium scolopendrium - 152 distinct forms listed. Most notable are the forms of 'Crispum', 62 in all! Treasures in the 'Crispum' group which are now lost or unrecognised are 'Cowburnii', 'Grande Moly', 'Splendens Moly', 'Gray', 'Fimbriatum Cropper' and, of course, many more. There are, however, interesting omissions - for example, there was no 'Crispum Fimbriatum Stansfield'. Other than crispums the range of varieties was fairly predictable with similar forms of most being available today; one exception, now extinct, is 'Viviparum O'Kelly'.

Asplenium trichomanes - 5 forms including the long lost treasures 'Incisum Clementii' and 'Incisum Moly'.

Athyrium alpestre - one variety 'Cristatum', a cultivar I have never seen mentioned anywhere else.

Athyrium filix-femina - 109 named forms listed. Most are still grown today as originals or progeny - eg 'Clarissima', 'Frizelliae', 'Gemmatum', 'Kalothrix', 'Victoriae', 'Uncoglomeratum' and several of the 'Plumosum' group. However, there are several plumosums unknown now, eg 'May', 'Hodgson', 'Horsfall', and 'Stansfield'. He also grew 'Elegans Parsons' the parent of the 'Plumosum Superbum' range raised by Druery. In about 1916, he lost 'Girdlestonii', one of the most beautiful forms which was illustrated by Druery (1910); it is presumably extinct today.

Blechnum spicant - 9 forms. 'Serratum' and 'Cristatum' forms are grown today, but in addition Cranfield grew 'Lineare Barnes', 'Trinervo-coronans' and 'Imbricatum'. Similar forms could reappear in sowings.

Dryopteris aemula - 1 cultivar - 'Cristata'. Known until fairly recently but, sadly, now lost.

Dryopteris affinis - 20 cultivars. Most still in cultivation, either as original clones or sporelings. There were only two cultivars apparently unlike any we know today - 'Fimbriato-cristata' and 'Pericristata Apospora'.

Dryopteris dilatata - 15 cultivars. Again nothing of great interest, apart from the form of 'Foliosa-cristata' originally collected in the Azores - this is now presumed to be a form of *D. azorica*. It would be interesting to know if this cultivar is still in cultivation.

Dryopteris filix-mas - 39 forms. Again, as above, most still in cultivation either as original clones or sporelings.

Dryopteris oreades - 9 forms. Again, nothing greatly different from anything currently in cultivation.

Gymnocarpium dryopteris - only one cultivar - 'Plumosum', which is not uncommon today.

Oreopteris limbosperma - Cranfield grew 12 cultivars, all are now extinct although we do have a narrow form recently found in the Radnor Forest not unlike 'Angustifrons Whitwell'. Other treasures on his list included 'Filifera Wiper', 'Plumosa Dr Stansfield' and 'Grandiceps Smithies'. These may not have survived until the 1940s as Cranfield admitted to having difficulty with growing *Oreopteris*, although 'Plumosa' was still in good form in 1932.

Osmunda regalis - Surprisingly, apparently only one cultivar, 'Cristata'.

Polypodium vulgare agg. - 71 forms. Surprisingly he had very few forms not known today. Exceptions are 'Grandiceps Parker' - grown fleetingly by Reg Kaye in the 1930s - and 'Cambricum Hadwinii'.

Polystichum aculeatum - In Cranfield's day cultivars of *Polystichum setiferum* and *Polystichum aculeatum* were not always correctly differentiated (eg 'Plumosum Bevis' was put under *P. aculeatum*). I believe Druery only grew about 5 or 6 forms of genuine *P. aculeatum*, of these none were first class.

Polystichum lonchitis - only one cultivar - 'Cristatum'. Probably now extinct, but there is a crested form of *P. aculeatum* var. *cambricum* in the Reginald Kaye collection, which could have been incorrectly placed under *P. lonchitis* in Cranfield's day.

Polystichum setiferum - This was the real hub of the collection with 278 cultivars, and this is where we find many of the most serious extinctions. Apparent losses include 'Acrocladon', 'Brachiatum Moly', 'Brachiatum Wills', 'Decompositum Splendens Moly', 'Divisilobum Crawfordianum', 'Divisilobum Moly', 'Divisilobum Nitescens' (to mention 3 of his 39 divisilobums), 'Plumoso-divisilobum Grimmondiae', 'Plumoso-divisilobum

Magnificum Edwards', 'Plumoso-divisilobum Pellucidum Stansfield' (to mention 3 plumoso-divisilobums out of 35 in the collection), 'Falcatum Moly', 'Hirondelle', 'Plumosissimum Birkenhead', 'Plumosum Patey', 'Plumosum Wollaston', 'Pulcherrimum Mrs Thompson', 'Pulcherrimum Variegatum Moly' and 'Revolvens'.

Pteridium aquilinum - 2 cultivars both still in cultivation.

Thelypteris palustris - one cultivar, 'Polydactyla', recently a similar form was offered on the BPS Spore List.

So there we have an outline of Cranfield's collection at Enfield in 1915, including about 50 of the best named cultivars now believed to be extinct. Of the 760 or so named cultivars known to be in the collection in 1915, we would need to add quite a few more to allow for subsequent additions from Druery, Henwood and other collectors. It would, perhaps, be a reasonable guess to assume the total collection peaked at something like 1000 different named cultivars.

Unfortunately, Cranfield does not seem to have given many plants away. Between 1900 and 1910 he did give a collection to E A Bowles in nearby Waltham Cross, and much later a small piece of *Polypodium australe* 'Grandiceps Parker' to Reginald Kaye (which died). Otherwise the final bequest to Wisley is the only gift I have been able to trace, apart from a few of his lesser varieties given to Jimmy Dyce in 1939!

Despite the almost immediate loss of *P. australe* 'Grandiceps Parker', a visit to Reginald Kaye's garden in Silverdale is a pilgrimage for today's fern enthusiasts - just imagine what it *might* have been like if this collection had not been the one that got away!

Acknowledgements

I would like to thank Jimmy Dyce and Peter Barnes for making available much of the information summarised above.

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SHORTER NOTE

Ornaments from Ferns

This year (1992) I was fortunate to be able to join an expedition to the heart of Irian Jaya, the Indonesian half of New Guinea. Our base camp was set up beside the highest village in the area at 2430m altitude (c. 8000 ft). The village people belong to the Dani tribe, and their dress was very botanical with the women wearing skirts made from *Eleocharis* (Cyperaceae) and the men wearing gourds (Cucurbitaceae).

Only the men wear armlets (above the elbow) and tight bracelets (forced over the hand with the help of pig-fat as lubrication). The men weave these armlets and bracelets from the vascular bundles of a fern (*Dicranopteris*, illustrated on p.95 in *A World of ferns*, Camus, Jermy & Thomas). These fibres are naturally light-coloured, but they can be stained darker by steeping in anaerobic mud. The different shades are woven into attractive designs.

JOSEPHINE M. CAMUS

POLYSTICHUM SETIFERUM 'DIVISILOBUM BLAND'
(PLUMOSO-DIVISILOBUM 'BLAND')

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Following up my article in the *Pteridologist* in 1990 (Vol. 2, No. 1) I have to report that two more forms in this section of variation in *Polystichum setiferum* have been found.

First, for the benefit of newer members who have not seen my previous article, I have to explain that, although the variety was named *Divisilobum Bland*, (Fig. 1) it is, in fact, a *plumose* divisilobe. The plumose form is characterised by having larger and much wider pinnae than *divisilobum*, with the result that they overlap, making the fronds three-dimensional and greatly enhanced in beauty.

Found in the wild in Ireland about 1910, Bland is very much superior to all other grown divisilobes and has been regarded as the sole representative of its kind. Recently, a very beautiful divisilobe was discovered during a visit to the fern garden in Buckinghamshire of our member E W Wright (Fig. 2). It was not until it was examined more closely later on that it was realised that it was *more* than a divisilobe - in fact, a *plumose* divisilobe. This was an exciting discovery, and I suddenly remembered that I had a rather similar setiferum variety growing in my garden, which I had never really scrutinised closely. It came to me very many years ago from the garden of our member Lt-Col P G Coke (Fig. 3) when he lived in Gloucestershire. A much more close examination showed that this too must be classified as a *plumose* divisilobe.

The result is we now have *three* varieties in this very rare section of variation in *P. setiferum*, instead of only one. It should be added, however, that Bland is still the best one and continues to be the type of plant for the section. Pinnae from the three forms are depicted here.

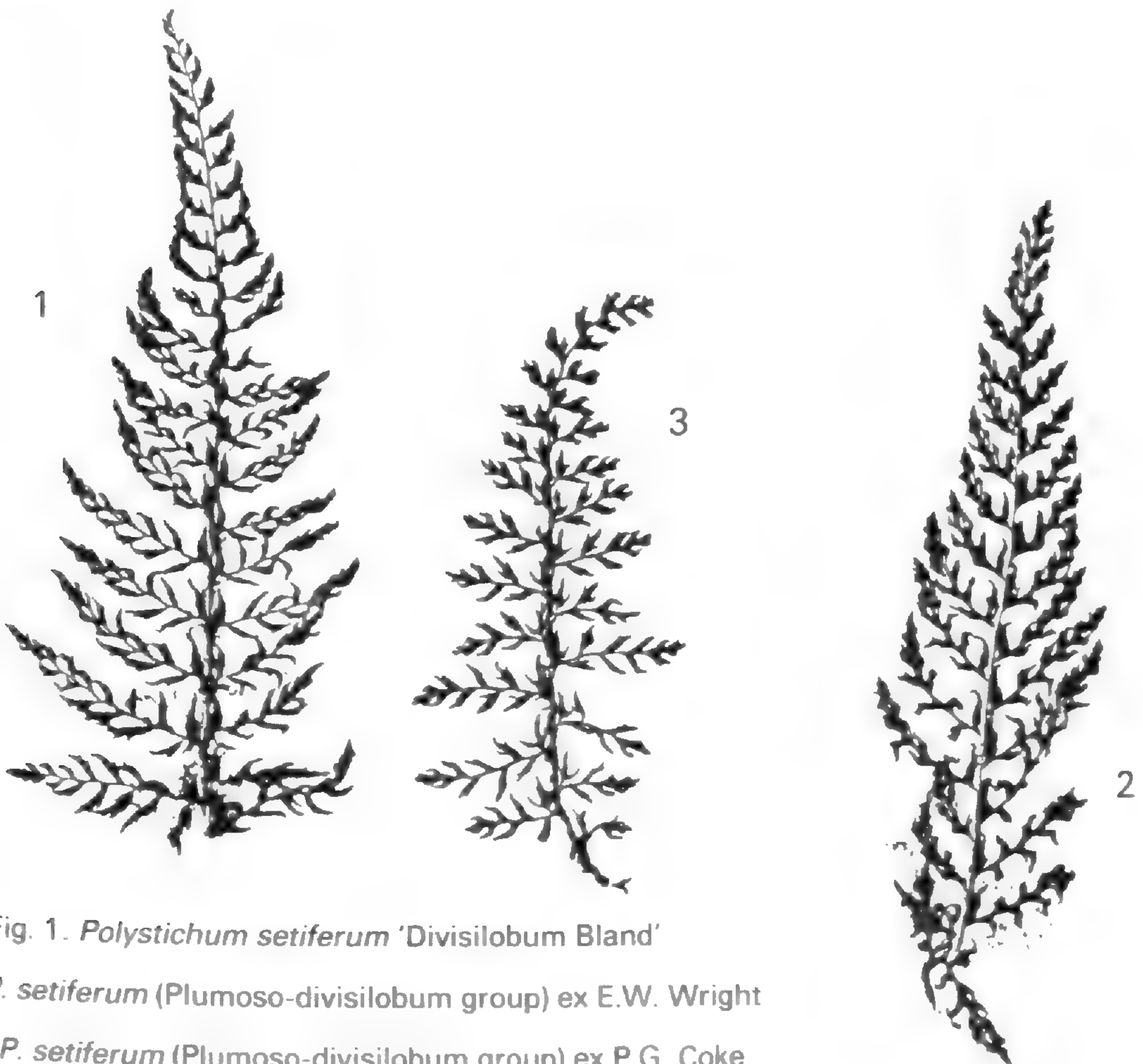


Fig. 1. *Polystichum setiferum* 'Divisilobum Bland'

Fig. 2. *P. setiferum* (Plumoso-divisilobum group) ex E.W. Wright

Fig. 3. *P. setiferum* (Plumoso-divisilobum group) ex P.G. Coke
 (All pinnae from basal third of frond)

BPS PLANT EXCHANGE

PETER HAINSWORTH, Station House, Achnashellach, Strathcarron, Ross, IV54 8YR. Scotland.

After sending and receiving a number of parcels through the plant exchange myself this year, a problem or two came to light and a few more were suspected. Rosemary Hibbs and I thought it might be a good thing to collect experiences from others taking part. We discovered that at least 50 parcels were exchanged, with, usually, several plants in each, so the exchange is certainly well appreciated. Quite a number of new members took part and they, understandably, were not very clear about what was being offered. Some had quite a surprise when they received little sporelings! There were a few embarrassing situations over payments too.

Most difficulties came under the headings of -

- 1) The purpose of the exchange.
- 2) Size of plant offered.
- 3) Packing.
- 4) Payment of expenses.

1) The purpose of the exchange

This is to give members an opportunity of widening their collections and to provide good homes for members' surplus plants. These may be of any size from tiny sporelings (which some members do not have time, experience or facilities to handle) to crowns from established plants. Most people send reasonably well established plants, from 2-3" pots, which may or may not be big enough to plant out in the garden straight away. So recipients should consider growing them on for another year. Garden centre sized plants are not normally offered. We don't particularly want to compete with them - if only on the grounds of expense.

2) Size of Plant

We think it would be very helpful, therefore, if members would indicate approximately what they are offering and suggest the following code, on an experimental basis -

- a) Crowns, i.e. pieces with roots, split off or divisions of large plants. Mark these "C".
- b) Sporelings, from a box or potted, one or two years old from the first frond. Rates of growth vary enormously between species so we suggest giving the length of the fronds to cover this. Mark them "Sp.1", or "Sp.2" for first and second year plants respectively and add 4" or whatever the length is. If they have been potted for some months and developed a reasonably good root ball add "P".
- c) Occasionally members may want to dispose of larger potted plants, in which case the size of pot will do, or well established outdoor crowns. Not recommended because of the weight and postage. Occasionally, too, rare plants may be offered. Indicate "R" and be sure to agree a price for such items before despatch! Some members may wish to dispose of fronds with bulbils, rhizomes and miscellaneous bits but again not really recommended except between friends.

Probably 95% will fall into the first two categories and should not present any classification problems. Inevitably some plants will fall between sizes, err on the smaller size perhaps, but we are not selling them so we don't have to worry about the Trade Description Act. However, please don't send detailed descriptions of your plants - think of the organiser, and there isn't room on the list anyway!

3) Packing

This is probably the main deterrent for members who might offer plants. It can be quite a lot of bother and that may be no guarantee that plants will arrive in good condition. A package has to withstand being thrown across a room into its appropriate bin at the sorting office. Plants **must** be tightly packed in their containers so that they cannot move. Another essential, unless you have plenty of time, is that a parcel needs to be quickly assembled from readily available materials. Searching around the house for plastic bags, tape, wrapping paper and a box to fit is a time wasting chore.

A few simple rules may help -

- a) Don't let paper or cardboard touch damp compost, it goes soggy in 24 hours.
- b) Pots, by their shape, are nearly impossible to pack firmly and their hard edges damage other plants.
- c) No empty spaces around plants. They allow plants and packing to move around and get damaged.
- d) Loose compost around the roots invariably drops out and creates empty spaces.

I use a "strait-jacket" method of sending plants, which might look a bit cruel to the recipient but I am told that they recover well after a day or two. It is quick, light and inexpensive. I am fortunate in having a plentiful supply of Sphagnum (bog moss) which makes ideal padding and can be stored indefinitely. (Stock up when you next get the chance). Shredded polythene, or bits of that cobwebby material used for crop protection would do. It needs to be soft, pliable but not lose its strength when moist. Below I give the method I use in some detail because it is the details of an unfamiliar task that get overlooked and you have to start all over again.

- 1) Take the plant out of its pot, shake off loose compost, wrap a little padding around its neck and fronds. Slip it into a small polybag or on a rectangle of polythene and roll it fairly tightly into a small sausage, with a dab of sticky tape to hold it.
- 2) Lay the several small sausages on a piece of stiff corrugated cardboard of appropriate size (ex supermarket box), printed side up so that you can write the address on the plain side. Form the small sausages into one large sausage, spacing out the root balls and putting the two largest at opposite ends.
- 3) Roll tightly in the cardboard to form a strong cylinder, two layers of cardboard thick. Roll your letter in at this stage and tape down. Fold the ends in for larger parcels, it adds strength but not necessary for very small ones. Slitting down the ends for an inch or so helps, then cover them with wide parcel tape. No need for wrapping paper or envelope, just write the address on the cardboard.

Very small plants can be wrapped and padded with damp kitchen roll then in a polybag and put in a matchbox or pill container.

Other members have equally satisfactory methods, usually dependent on materials and containers available. The common theme is firm packing.

4) Expenses

Postage must be reimbursed obviously, count the stamps before throwing the packaging away.

We are in this for fun so no hard and fast rules can be drawn for this. For most people time is valuable and some compensation for collecting, labelling and packing is appreciated. Some of us even have to travel a long way to a post office but usually manage some other job at the same time! Perhaps 25-50p per plant would be reasonable, according

to size, and rounded off to the nearest pound. Or the donor can give a guide. We don't want donors to feel that the exchange is not worth the bother, especially those who have much to give. Most requests arrive within a fortnight of the publication of the lists and it may lead to better distribution for donors to wait this time before sorting out the orders. The first envelope opened may have a request for five of one kind, a donor's entire stock. It is also easier to pack several parcels at one time. Many members pay by cheque. This is expensive for small amounts - first or second class stamps would be acceptable to most people. The best device is to swap your plants at meetings!

A few other points. Several beginners asked for a good but inexpensive book on fern cultivation for beginners. I am assured that Jimmy Dyce's "The Cultivation and Propagation of British Ferns" at £3.00 is the thing to have. (Out of print, but a new edition should be available by the time the *Pteridologist* is distributed. Ed.). Following on from this if you are offering out of the ordinary items and have access to specialist information, a photocopied sheet of details is enormously helpful.

Many young ferns change their appearance markedly as they grow, so if you have doubts be patient. But they *could* still be wrongly named - fern spores are notorious for getting into the wrong packet or pot on account of their small size and lightness. You are not allowed to *breath* while handling them!

As long as it is something new it will be interesting. If you have lots already - well there is always next year's plant exchange.

SHORTER NOTE

*Verification of a record of oak fern (*Gymnocarpium dryopteris*) from the Burren, Co. Clare.*

Coincidental with, and quite unaware of, Donal Synnot's production of his paper (*Pteridologist* 2: 139-143, 1992) in which he discusses the Irish records of the oak fern, and remarks on the apparent non-existence of a voucher for the Co Clare record, I produced the following note.

Oak fern is not recorded for the Burren in D. A. Webb & M. J. P. Scannell's (1983) *Flora of the Burren & Connemara*, Cambridge University Press. In March 1990 whilst engaged in cataloguing the Ulster Museum's pteridophyte collections I came across an 1876 specimen of this species from the S. A. Stewart herbarium numbered H1939-1941, which is labelled on the original label "near Roadford, Co Clare (in the wild district of the Burren) sparingly, Thos. Wright Jnr Aug 1876". There are two good, large fronds on the sheet, which were mounted or remounted in 1941 by staff of the then Belfast Municipal Museum & Art Gallery. This record is actually already in the literature - see Colgan, N. & Scully, R. W. (1898) *Cybele Hibernica* second edition, Dublin, page 452: "Roadside between Broadford (*sic*) village and the cliffs of Moher, Clare; T. H. Wright". Note how Roadford has become, incorrectly, "Broadford" in this publication; Roadford is at R0797, 2km NE of Fisherstreet according to the Topographical Index in Webb & Scannell (1983, above). The same record is repeated, with the incorrect name "Broadford", in Praeger, R. L. (1901) *Irish Topographical Botany* Dublin. So far as I am aware there is no place called Broadford in Co Clare.

Miss M. Scannell, to whom I showed the specimen in early 1992, has commented that she and her co-author had probably ignored the record on account of the absence of any further information and the apparent absence of a voucher.

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GROWING HARDY FERNS WITHOUT SHADE

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The popular gardening press often seems to suggest that ferns can only be grown in shady gardens. This is a pity because it imposes unnecessary limitations on those gardeners that would like to grow a few ferns in their gardens. I cannot deny that ferns grown in damp shade can provide superlative examples if well-grown, but I am firmly of the opinion that, if one chooses carefully, many ferns can be grown in quite open sunny positions. Time spent studying our native ferns in their numerous habitats will quickly confirm this.

The most obvious example is the common bracken. This is often encountered in sunny hedgerows, on canal and railway embankments. It also clothes acres of sunlit hill-sides. Admittedly, in such conditions it has a much shorter stature and less lush fronds. This is the price we may have to pay if we are to extend our fern planting into the more sunny spots in our gardens, for growing our ferns in this way will have the same effect on most of them. Our common male fern, *Dryopteris filix-mas*, can be found in even more extreme habitats, such as fissures in cliffs and brick walls, as if to emulate the truly mural aspleniums. Other species, such as the parsley fern, *Cryptogramma crispa*, the hard fern, *Blechnum spicant* and even the oak fern, *Gymnocarpium dryopteris* are occasionally found on south-facing screes. All apparently show a tolerance for hot sunny places, as long as they have their roots in cool moist soil.

The one group of ferns that I would recommend for growing in borders with limited or no shade, is the scaly male fern, *Dryopteris affinis* and its varieties. I have grown various *D. affinis* forms in a very hot front garden for the last eight years with no losses. At midsummer they are in full sun from 6 a.m., until the cooling shade of the house reaches them at about 2 p.m. They do not gain the stature that their more fortunate brothers attain in more equable conditions and they do look somewhat leathery by early September, but they thrive and provide much pleasure throughout the summer. If you are cursed with a sunny garden, plant *D. affinis* and its varieties.

Some years ago, I was obliged to plant a fern border in what I considered to be a very unsuitable position. It was open, sunny and wind-swept. It was planted with varieties of *Dryopteris affinis*, *D. filix-mas*, *D. dilatata*, *Polystichum setiferum* and its varieties, *Osmunda regalis*, and two or three varieties of lady fern, *Athyrium filix-femina*. All but the latter have done well. In addition, I planted *Blechnum penna-marina*, *Hypolepis rugulosa* and *Polystichum munitum*. Again, all three have done well, especially the hypolepis, which seems to thrive in the sun. This border is subjected to some eight hours of sunlight at mid-summer.

Success with ferns in such situations is largely due to the composition of the soil. I have come to the conclusion that heavy, sticky clay is the fern-growers best friend. It is both moisture retentive and fertile. Throughout a long, dry period, the surface will bake hard; it will shrink and crack but it NEVER dries out. I have found that once the ferns are well rooted into the clay, the fern border requires little or no watering. Matters can be improved further by late winter mulching with bulky organic materials. Watering is restricted to those ferns that have been planted for less than two years. After two years they can fend for themselves. Water in late evening and NEVER spray the fronds, it's a waste of time and water. Only when established ferns are showing obvious signs of distress do I relent and water them.

For those that garden on thin or sandy, free-draining soils, growing hardy ferns without any shade would be a risky business. Careful and elaborate preparation of the soil is essential to ensure moisture retention in the driest summer. The proposed fern border must be well prepared by incorporating generous amounts of bulky organic material.

Good garden compost, stable manure, leaf-mould, spent hops, spent mushroom compost, coir fibre and, risking the wrath of the bogophiles, sedge peat can be used to provide the moisture retaining sponge called humus, so essential for a healthy soil. Never let a season commence without a liberal application of a surface mulch. Ensure that the soil is wet before you apply it.

It is my experience that as long as most of these ferns can draw on an inexhaustible supply of moisture, they will tolerate long periods exposed to sunlight. To ensure a cool moist root run, consider the use of stones placed around the plants. This is especially effective for hart's tongue ferns, and with the correct choice of stone, will look most decorative. Stone cover is the essential ingredient that ensures the survival of ferns on mountain or quarry screes.

The hart's tongue fern, *Asplenium scolopendrium*, will tolerate some sunny hours but it will tend to be smaller and paler, and lack the lushness of plants grown in shade. However, the golden form, *Asplenium scolopendrium* 'Golden Queen', really needs a bright situation if it is to show off its gold colouring to its best advantage. Plant it in shade and it will lose its variegation.

Based on my own experience and situation I have compiled a table of what I consider to be the sunlight tolerance of hardy ferns. I omit those I do not grow. For light soils, I suggest you halve the hours of tolerance.

Ferns that will tolerate six to eight hours of sunlight:

Dryopteris affinis, *D. filix-mas*, *Polypodium australe* and *P. interjectum*, *Hypolepis* sp., *Gymnocarpium dryopteris*, *Cryptogramma crista*.

Ferns that will tolerate three to four hours of sunlight:

Polystichum setiferum, *P. aculeatum*, *Dryopteris erythrosora*, *Blechnum penna-marina*, *Polystichum munitum*, *Osmunda regalis*.

Ferns that will tolerate one to two hours of sunlight:

Adiantum pedatum, *A. venustum*, *Athyrium filix-femina*, *Oreopteris limbosperma*.

Given sufficient moisture, most hardy ferns will tolerate a little sunlight, but I would provide total damp shade for *Matteuccia struthiopteris* and the extremely fine forms of *Athyrium filix-femina*.

So do not allow a lack of shade to prevent you from growing a wide selection of hardy ferns. Prepare the soil well and experiment with the commoner species and varieties. There are many hardy ferns I have not mentioned but most are worth trying.

PROPAGATING VARIETIES OF POLYSTICHUM SETIFERUM FROM BULBILS.

A R BUSBY, 16 Kirby Corner Road, Canley, Coventry, CV4 8GD

On the 'Divisilobum', 'Acutilobum', and 'Multilobum' forms of the soft shield fern, *Polystichum setiferum*, bulbils appear as dormant 'buds' in the axils of the fronds' rachides and pinnae.

Occasionally, bulbils on old fronds that are in close contact with the soil will root themselves; however, usually we have to provide the opportunity for bulbils to root and form plantlets.

This can be done by pegging down the frond with bulbils with wire ties so that it is in contact with the soil and still attached to the plant. Alternatively, the frond can be removed from the plant and pegged down on compost in a seed tray. After watering,

it can be placed in the shade of a wall or in a cold frame. The bulbils should be well-rooted in about six months. The rooted plantlets can then be separated and either grown on in pots or planted out in a shady nursery bed. Fronds that are removed from the plant and pegged down in a seed tray will require regular attention, particularly watering, from time to time as the frond must not dry out.

I have devised a way to root bulbils with the minimum of attention and this has proved to be highly successful.

Prepare a small area in a shady part of the border or a cold frame by forking over the surface to a depth of an inch or two (25-50mm) with a hand fork. If your soil is light and free draining, incorporate a handful or two of peat or peat alternative to retain moisture, and then water the area well. Now lay the frond on the surface making sure that the bulbils are in close contact with the soil but not covered by the soil, and lay a sheet of glass on top of the frond. The weight of the glass keeps the bulbils in close contact with the soil, maintains moisture in the soil and allows light to the developing plantlets.

I have found that, with this method, rooting occurs in four to five months and they require little or no attention. Once the bulbils are well rooted (test for this by lifting the glass and gently pulling at the rachis) cover with a plastic propagating cover to provide room for the bulbils to produce their fronds. The cover can be dispensed with once the bulbils can be seen to be growing well. Finally, after two or three weeks without the cover, carefully lift the bulbils avoiding any damage to the roots, and with a sharp knife or secateurs, separate the plantlets by cutting through the old rachis. They can now be potted up or transferred to a nursery bed for growing on.

I have tried this method using a polythene sheet held down with stones instead of using a sheet of glass, but the results were poor. The weight of the glass keeping the bulbils in close contact with the soil seems to be the significant factor in producing well rooted plantlets in reasonable time.

ON 'CURLIES'

EDWARD WRIGHT, Hall Place, Wycombe End, Beaconsfield, Bucks. HP9 1NB

My great uncle Edward Goddard was in the timber trade in Hull and sometime between 1903, when my mother was married from Ferriby Hall where she had been brought up by her aunt and uncle, and World War I, built a substantial house nearby, The Red House, Swanland Hill, North Ferriby, North Humberside. He was a pioneer of rock gardening and built a fine rockery at his new home, including among the plantings a considerable range of ferns and, more particularly, the hardy varieties which were still traded by the nurserymen of those days. My elder brother (Willy) and I had developed an interest in ferns as far back as the 1920s - *Gymnocarpium dryopteris*, for instance, could be found on Sunday walks from Prep. School on Oliver's Mount at Scarborough. We therefore kept an eye on Uncle Ted's collection when he remarried, and when the Red House was inherited by my mother we raided it extensively and replanted the catch at our family home, Tower House, also at North Ferriby (see phot. opp. p 181), before the Red House was sold. My brother maintains that Uncle had most of his plants from Backhouse of York although I have had some leaning towards Pennells of Lincoln, largely because the Goddards had Lincolnshire connections. Be that as it may, he and I filled out the collection with some judicious purchases from Backhouse in the 1930s and kept the majority going happily until World War II.

After the war when we each got married and set up house for ourselves, he in London and I for two decades in the East Riding, we literally split Uncle Ted's ferns and established

matching collections in our own gardens. There were a couple which refused to split: a *Polystichum setiferum* 'Congestum' cultivar (very dark and small resembling 'Obtusissimum'), which he kept and possibly *Polystichum x bicknellii* which we had collected in Dorset in 1929, which fell to me and I still have. The latter may be simply *P. aculeatum*, however. The two collections survived various moves, in his case from one garden to another in London and thence to Dorset (The Old Rectory, Seaborough), although he nearly lost the *P. setiferum* resembling 'Obtusissimum' in his London days. My collection had another move in East Yorkshire before transfer to the Home Counties: first to Taplow where some were left and since 1979 to Hall Place, Beaconsfield where they still reside. I have split some with a neighbour for safety's sake and have often thought of a secure long home for some at least of the scarcer survivals. Since ferns began to come back onto the market I have bought several from the late Reginald Kaye and exchanged a few with him too; more recently I have traded with Fibrex Nurseries where the stock has always been a temptation to a lover of 'curlies', the term for ferns which was adopted in the family from a nephew's description as a small boy.

Early this year I learned from my brother that Martin Rickard had read of his collection in the Yellow Book of the National Gardens Scheme and while on holiday nearby went to see what there was there. He had apparently been staggered to find a number of survivals from the early days, particularly some of the polypodiums, which until fairly recently he had thought to be extinct. I therefore contacted Martin to see if we might arrange for an exercise in recovery by members of the Society from my garden here at Beaconsfield and eventually, after a reconnaissance visit by him in June and a wettish summer, it was arranged for a dozen or so senior members of the British Pteridological Society and wives to spend an afternoon with us in October. Naming of names would perhaps be individious, but no apology is needed when I say that Jimmy Dyce himself graced the proceedings.

What did they find? The main attractions were *Polystichum* varieties which do pretty well here and there was a ready market for crowns of a *P. setiferum* cultivar resembling 'Hirondelle' and a very fine 'Plumoso-divisilobum' which came from Uncle Ted's (see separate note by Jimmy Dyce p. 167). Unfortunately there were only single plants available of *P. setiferum* 'Gracillimum' and 'Congestum' (not the 'Obtusissimum form'), the former going very properly to Matt Busby to look after. I have one left of each and hope they will proliferate. The same is true of remarkable plants of a second type of *P. setiferum* 'Plumoso-divisilobum' and a polystichum, a crown of which was given me by my brother, acquired by him from Oxford Botanic Gardens and labelled as *P. aculeatum* 'Pulcherrimum', but which we now know is *P. setiferum* 'Plumosum Bevis'. Both are very large and busy producing more crowns for the future; but not just yet. We are therefore biding our time while expansion occurs.

The polypodiums ('Polypodies' surely as Druery calls them!) also attracted attention. Uncle Ted's garden had produced several good cultivars, two grandiceps, probably 'Grandiceps Fox', and another slightly less heavily crested, at least two different types of 'Cornubiense'; and one which escaped the visitors, 'Bifido-multifidum'. The grandiceps cultivars had multiplied well and all present had a piece - in spite of an earlier plastic pot found surrounding the roots! The cultivar 'Bifido-multifidum' is being nursed for the future after removal to a more congenial position just in time, having gone back badly where it was.

A welcome cup of tea, gingerbread all round and the final 'auction' of bagged ferns made up for the cold wind to make it a more than worthwhile exercise - and other's willing hands had done all the digging and dividing!

THE CRANFIELD COLLECTION AND WISLEY

MARTIN H RICKARD, The Old Rectory, Leinthall Starkses, Ludlow, Shrops. SY8 2HP

It is well known that Cranfield opted to will his ferns to the Royal Horticultural Society Garden at Wisley rather than pass them on to a true enthusiast (Also see Rickard, 1993). I believe Cranfield should have realised that public gardens are not the places for large specialist collections of any herbaceous plants, but was the move as disastrous as the stories suggest? Were the ferns really left uncollected at Enfield? What happened to the plants which did make it to Wisley? These questions have been at the back of my mind ever since I learned that Reg Kaye attempted to buy the collection. Now, thanks to a wealth of material brought to my attention by Peter Barnes of Wisley and the chance to talk to some of the students at Wisley at the time, fresh light can be cast onto some of these questions.

From correspondence held at Wisley, I was fascinated to learn that Cranfield gave two collections of ferns to Wisley, the first 'in Keble's time' i.e. long before his death; most of these died as they were treated as alpines. Despite this Cranfield did not learn any lessons and in October 1947 he asked J S L Gilmour, Director of the RHS Garden at Wisley, if he could come to Wisley to discuss his main fern collection, with a view to giving it to Wisley. Clearly Cranfield had intended transferring the plants in his life time but events overtook the operation and no ferns seem to have been transferred until after his death - on 29th May 1948. On the 30th July 1948 Mr Hanger, the Curator, visited Miss Muriel Cranfield at Enfield and collected a first instalment of ferns in pots. On 2nd of November 1948 a note appears in the RHS Council's minutes, 'The Director of the gardens reported that the late W B Cranfield's ferns had been received and planted'. Also in a letter from Gilmour to a Mr Long dated 2.11.48, he refers to the 'last load of ferns as it is a whole lorry load on its own'. This suggests there was more than one lorry load.

The next day, 3.11.48, Gilmour wrote to Miss Cranfield 'Now that the collection of ferns has arrived safely at Wisley and has been planted in the Wild Garden, I am writing once again to send you my very best thanks for this magnificent gift. . . . The ferns look extremely fine in their new position.'

On 24.3.49 Gilmour wrote to a wire supplier seeking labelling material for the ferns. In his letter he says 'We are most anxious to label a collection of nearly 1000 rare ferns that were recently presented to the Society . . . ' Due to post-war shortages the materials were not immediately forthcoming but later an allocation of wire was obtained by Robert Adams, a student at the time, through an associate in the Surrey Agricultural War Executive Committee.

In late August 1949 Muriel Cranfield finally visited Wisley to see her father's collection in situ. She wrote to Gilmour that 'My uncle and I visited Wisley at the end of August specially to see my late father's collection of ferns. Which we thought looked very happy and in a delightful position, which they appeared to appreciate. We were sorry not to see anyone to whom we could give a message of appreciation . . . ' Not long after Miss Cranfield's visit there was repeated trouble with the newly installed irrigation system and, what was more, difficulty with the supply of water to the garden as a whole.

Gilmour replied on 20.9.49 ' . . . The plants certainly seem to have done well, due largely, of course, to the water that we have laid on so that we can keep them constantly moist in dry weather. You may have noticed that we have not yet been able to label them as they deserve but this is in hand . . . ' Pat Bance, a student at the time, confirms that by autumn 1949 they were all neatly labelled and looking good.

From the above correspondence it is clear that a large collection of ferns was indeed transferred to Wisley, and at least initially looked in fine form in the Wild Garden. Irrigation had been installed and seemed to be working well.

In support of Gilmour's statement that he had 'nearly 1000 ferns' we have a Wisley notebook listing all the ferns and giving the location of each in the Wild Garden. From these records we know that 730 plants of 279 different cultivars and seedlings were planted out in eight beds in the Wild Garden in 1948. In addition there are rumours of plants having been kept under glass. Altogether these plants could easily amount to Gilmour's stated 'near 1000'.

Francis Hanger, who supervised the removal of the ferns, died in 1960, but I have contacted several of the students who assisted him in 1948. With a few discrepancies, inevitable after the passage of so much time, their combined evidence supports the idea that the collection was substantial. For the record the following former students have been contacted:

1948 intake:

Henry Noblett who collected some of the ferns from Enfield and collated one batch.

Pat Bance (who worked with Brian Savage, now deceased) who went to Enfield and collated another batch.

Dick Robinson (who also worked with Brian Savage), who went to Enfield and collated some of the collection.

Tom F Thompson who worked on the final batch.

1947 intake:

Robert Adams did not go to Enfield but as Assistant to the Director he did some work with Mr Gilmour regarding the gift to the garden. Robert Adams was one of six students taken on at the time.

Collectively, these students were under Francis Hanger. He was a rhododendron man and, unfortunately, seemed to resent having to allocate staff to work on the Cranfield ferns.

Henry Noblett and Robert Adams find it hard to believe 730 ferns were collected. However Dick Robinson can believe there might have been that many. One of the students involved in the operation, Pat Bance, fortunately kept a notebook during his time at Wisley and he confirms that there were three lorry loads (a 3 or 5 ton van). The first consignment of 100 or so ferns was collected by Francis Hanger with assistance from students, while the second two loads were larger and more casually stacked in the lorry; he believes there were quite probably around 1000 ferns altogether although a lot were small. Seedlings and other potted specimens from Cranfield's frames and greenhouse were collected by Mr Hanger and stored under glass at Wisley. Pat Bance recollects that it took two to three weeks to plant the collection - surely a strong indication of its size?

Certainly the size of the area cleared, the evidence of Gilmour's and Muriel Cranfield's letters, the evidence of Messrs Robinson and Bance and the surviving Wisley list - together with a plan of the planted area - are all strong evidence that a collection of about 1000 ferns did in fact arrive at Wisley. In addition the area of ground given over to the collection was more than large enough to house 1000 plants.

Contradictory evidence comes from Henry Noblett, Robert Adams as above, and Jimmy Dyce. Jimmy visited the site with Percy Greenfield, early in the 1950s, soon after it was set up and he does not recall anything like 1000 ferns. Indeed the ferns that were there were largely of no great merit, and many were simply labelled 'Cranfield seedling'. There can be no doubting Jimmy's record so how can we reconcile these contradictory points? My only suggestion is that Jimmy's visit was a year or two after the collection was planted and it had already begun to deteriorate. Evidence from Robert Adams confirms

that weeds overtook the site and there were serious problems with the irrigation system, so the decline was rapid. However, in September 1952 Pat Bance remembers the overall appearance of the collection was still good - although there might have been some gaps.

In the Wisley file there is another list, part labelled 21.12.59 which includes 199 ferns - all wintergreen, therefore suggesting that this was a list of living plants compiled in winter (December) rather than some other inventory. So, was the collection in 1959 still as large as perhaps 300 ferns (including deciduous cultivars)? The ferns on this list were the Cranfield ferns because the label numbers agree with the 1948 record.

Today it seems that perhaps only a dozen or so Cranfield ferns survive at Wisley, and even then they are not separable from more recent acquisitions. I did wonder if the collection's rapid demise was due to them being transplanted or given to other gardens but Robert Adams, who remained at the Garden for some years after the ferns were planted, believes this is most unlikely.

Cranfield's *original* collection included probably around 1000 different cultivars at its peak (Rickard, 1993). However, in the final years the collection sustained serious losses, as reported by Cranfield himself in a letter to Gilmour at Wisley on 17.10.47 - 'Whilst my collection has suffered very much owing to my several severe illnesses, shortage of labour and the collapse of the roof of my fernery during the last winter, it is still the finest in the country and embraces the life work of my men'. The actual number surviving at Enfield in 1948 is therefore questionable but reports that many were left behind and eventually flame-gunned (Dyce, 1991) are no doubt true. I am sure various pteridologists have inspected the old gardens at East Lodge, Enfield over the last 45 years. I am no exception! The site is largely undeveloped but the house is close to dereliction and the garden is completely overgrown apart from the area where his fern bays were sited - this is now a standing out area for a nursery long established at the site. I did discover one just fern cultivar within the boundary of the old garden - *Pteridium aquilinum* 'Percristatum'.

Pat Bance tells me that some ferns were left at Enfield at Muriel Cranfield's request. She appeared with labelled sticks and marked about two dozen of the best plants she wanted to keep. Some had already been removed and had to be replaced. What happened to these plants? They were fairly certainly real gems as Miss Cranfield obviously had a good knowledge of the ferns in the collection. Are these among the plants we believe were flame-gunned, or were they passed down to other friends or relatives of the Cranfields?

The ferns which actually arrived at Wisley, if Wisley's own list is to be believed, included many classic cultivars very rare or not known today, including:

Polystichum setiferum 'Hirondelle' (original clone), 'Cristatum Moly', 'Divisilobum Crawfordianum', several plumoso-divisilobums, 'Plumoso-foliosum Stansfield', 'Plumosum Green', 'Plumosum Patey', 'Pulcherrimum Dr Stansfield' and 'Pulcherrimum Variegatum Moly seedling'. *Athyrium filix-femina* 'Fimbriato-cristatum Garnett', 'Cristatum Kilrushense Druery', 'Plumosum Horsfall', 'Plumosum Stansfield', 'Superbum plumosum crispatum', 'Superbum plumosum dissectum' and 'Todeoides'. *Asplenium scolopendrium* 'Crispum Splendens Moly', 'Crispum Majus Moses', 'Crispum Fimbriatum Lowe' and 'Drummondiae'. Some of these are still in cultivation but most must now be presumed extinct. Why these were not detected by the trained eyes of Percy Greenfield and Jimmy Dyce I do not know.

In conclusion, this enquiry has confirmed that a very large number of first class cultivars were lost with the demise of this collection, either by being left at Enfield, or by various misfortunes over the years at Wisley. It was clearly a serious loss to the fern cult. However,

thanks to the likes of Jimmy Dyce, Reg Kaye, Robert Bolton, Jean and Jack Healey and several others, many of the choice older cultivars have passed on to fellow enthusiasts. This ensures their continued survival, and minimises the effects of the loss of Cranfield's magnificent collection.

In summary I hope these notes will clear up much of the uncertainty surround the Cranfield collection and Wisley. We must all learn from this experience.

Acknowledgements

This account would not have been possible without the generous help of Robert Adams, Pat Bance, Peter Barnes, Jimmy Dyce, Henry Noblett, Dick Robinson and T F Thompson.

References:

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SHORTER NOTE

Saved by a Fern

While the 1991 centenary celebrations were in full swing in the Lake District, I was on the other side of the world and in a far from celebratory state - sitting under a tarpaulin half-way up a mountain on the island of Sulawesi (Celebes), Indonesia, with a dislocated knee and surrounded by tantalising ferns that I couldn't collect. The rest of the expedition had continued to the summit leaving me with a porter, and the hope that I would recover enough to be able to hobble back down the mountain on their return.

After a week I felt quite cheerful because, with the aid of very stout walking stick, I had managed the five metres down a boulder-strewn slope to the river by myself. The river was flowing very fast, and the numerous boulders made it almost continuous rapids, but a few metres up-river there was a comparatively peaceful stretch and I half-crawled there to have a bath. I left my stick on the bank as a row of two metre high boulders gave me support to get knee-deep in the water. The river here was about ten metres wide, and there was a small clearing on the other bank.

As I rinsed the soap off myself, I heard the sound of a large animal crashing through the forest on the other side of the river, I froze, thinking it must be an anoa - a species of forest buffalo endemic to the area - and hoped I would be able to get a good view of it as it came down to drink. Unfortunately the anoa winded me and charged across the river, head down and long, pointed horns aimed for attack! Time slowed right down as I stood there, unable to move away and thinking I surely should do something to stop it pinning me against those boulders with its horns.

The *Cyathea* saved my life as I gazed into the pupils of the anoa's eyes. The tree fern trunk was lying diagonally across the water in front of me, reaching from the bank to the huge boulders, and deflected the charge of the anoa when it was barely a metre from me. The anoa did not jump it, but ran on into the forest.

JOSEPHINE M. CAMUS

WOODWARDIA RADICANS ON CRETE

JAMES MERRYWEATHER, *Biology Department, The University, York, YO1 5DD*

I spent the first week of April 1992 based at the delightful ancient, crumbly port of Chaniá on the north coast of western Crete. The most enduring memory of the week was stench of rotting oranges in the mountains, for this was the time of the frantic orange harvest and there was a glut. The growers just carted excess fruit as far away from the villages as possible and poured them over the hillsides to form vast squidgey, smelly screes. Occasionally I would see an enclosure full of sheep happily standing on/in, and chewing their way through, piles of old oranges, an unfamiliar experience for those accustomed to slow-witted grass munchers of the Yorkshire Dales!

I spent five days in the hot sunshine, walking miles through cool olive groves or out in the heat of the upland garigue, accompanied by the sweet aromas of wild thymes, sages, lavenders and oregano. Bracken was ubiquitous, *Adiantum capillus-veneris* common in soggy places, and on many shaded earthy banks I found huge specimens (up to 10cm!) of *Anogramma leptophylla*. Every so often I came across horsetails, *Equisetum telmateia* and *Equisetum ramosissimum*, which frequently grew together. Each had features which caused me to stop awhile and think. At one site *E. telmateia* had fertile spikes which, having shed their spores, were not wilting away as is familiar to the Brit. abroad, but were producing green side branches so as to resemble the vegetative spikes. *E. ramosissimum* frequently had a variety of shoot types, from the usual much branched to sparingly branched. What was remarkable was that what I at first assumed were spikes of an intermixed colony of *E. hyemale* turned out to be nothing of the sort. They were relatively soft and not rough as expected. These were just fat, glaucous unbranched fertile spikes of *E. ramosissimum*. Other common species I encountered (apart from those mentioned below) were *Asplenium ceterach*, *Cheilanthes fragrans* and *Dryopteris pallida* which looks very much as our *D. submontana* might do if it were growing in woodland.

Anyone who has visited Greece in spring will know of the fabulous diversity of flora available for exploration, and Crete adds to the usual with a plentiful supply of endemic or out-of-place species. On the last day (a day of gales and horizontal rain sent to contrast with the previous luxurious sunshine) I hired a moped to range beyond the bus routes and check out reports of one of these species, *Woodwardia radicans*, a fern of generally Atlantic distribution, and Crete is about as far east as it has been found. As a guide, I took with me a copy of a paper describing a fern collecting trip in 1971. (Brownsey & Jermy, 1973).

The directions given were a little vague: "Between Néa Roúmata and Skinés we found the small waterfall noted by Dr Greuter as a locality for the Atlantic fern *Woodwardia radicans* . . . wet, shady gully . . . *Blechnum spicant* . . . etc." They had written that their return to Chaniá was "brisk", so I reasoned that the waterfall and gully must be near the road. From Skinés onward I stopped the moped's engine at every likely-looking spot to listen for trickling water. For several miles I continued in this manner, passing through the villages of Hliaró and Langós. After Langós I crossed a little bridge with a white parapet which traversed the main stream of the valley I was climbing and then I heard water to the left of the road. A little pathway was trodden into the gulley here and I was encouraged to think that other botanists might regularly visit the place - no sheep nor Greek would have gone in here. I pushed past a rill dripping with wet-places-ubiquitous *Adiantum capillus-veneris* and there were three fronds (two plants) of *W. radicans*, just a couple of metres from the road. The guide said there were more, associated with *Bechnum spicant* further into the gulley. I didn't find them. Perhaps this was another gulley. I did find: *Athyrium filix-femina*, *Asplenium onopteris*, *Pteridium aquilinum*, *Blechnum spicant*, and thirteen beautiful plants of *Osmunda regalis*. Greek

terrain, in my experience, has always been rather arid. This was like being in Yorkshire woodland, if it weren't that the tree species were so different: a grecian oak, sweet chestnut and cypress.

I continued up the road, despite deteriorating weather, crossed a second parapeted bridge beyond which the road began to ascend in earnest, hair-pin bending over the mainstream gully. There were plenty of other likely ferny wooded gullies, but none so good as the one at the final hair-pin before the woods were left below as the terrain opened out towards Néa Roúmata. After searching for *Woodwardia* (see opp.) in the woods I was amazed to find that the roadside bank, just across the stream, bore about twenty large specimens. As I walked back towards the stream the bank became wetter and *Woodwardia* gave way to *Osmunda* and that, in turn, was replaced by *Adiantum*. That was enough joy for a wet and cold fair-weather pteridologist, and I set off down and coastward looking for the sun. It wasn't there. Neither was I able to identify the Brownsey & Jermy site for *Christella dentata* on the way, but I had seen enough to keep me happy until my next visit to Crete - an inevitability!

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BROWNSEY, P.J. & JERMY, A.C. 1973. A fern collecting expedition to Crete. *British Fern Gazette* 10: 331-348.

SHORTER NOTES

Decorative Bracken

I live within range of Heathrow and do a sort of availability gardening. Suitable looking cuttings from bouquets are hopefully potted and put in the conservatory. Usually nothing very much comes of it so I put the pot contents in the garden en masse. I have therefore delightful little mossy, ferny areas in the garden which seems to attract seedlings, mostly foxgloves at the moment.

However, this little fern (see opp) grew in its delicate green lacery, so I repotted it in a basket about a foot in diameter with other hopefuls, including pelargoniums and tradescantia. I don't think it had much of a rhizome or else I would have noticed. The tradescantia did well as usual but the fern was cascading down the basket across the table and down on to the floor. As it was being trodden on I had the basket raised and put on a ceiling hook; it is now growing up and down beautifully.

Thinking I would like to know more of my two-year old friend I searched Kew's new fern garden outside the Filmy Fern House, the House itself and, indeed, all the other houses, but in vain. Intrigued and wanting to know more about it I asked during my research period in Kew Herbarium Library - but the books on pteridology were on the floor above.

I was fortunate to be introduced with my specimen to Peter Edwards who immediately identified it as English bracken 'reared in unusual conditions'.

I was able to give so little information, as I do not remember actually seeing it in a bouquet, so I realized it might have arrived in its spore stage. I gave the specimen I had brought to Peter Edwards and it was pressed for inclusion in the Herbarium collection.

The fronds that had grown along the floor were clustered together and to pick off a specimen was like trying to separate matted paper doyles. Since hanging the basket up the leaves have had more room. The soil must be very poor by now as I just watered in the specimens after inserting them in the original existing soil of the presentation basket. It is a pale emerald green in colour, has no spores that I can see and the stalk is crisp and snaps easily, the tissue being easily bruised. The usual bracken smell is not evident until it is crushed.

PAT SCROPE-HOWE, F.R.G.S.



Woodwardia radicans, Crete



Pteridium aquilinum immature fronds

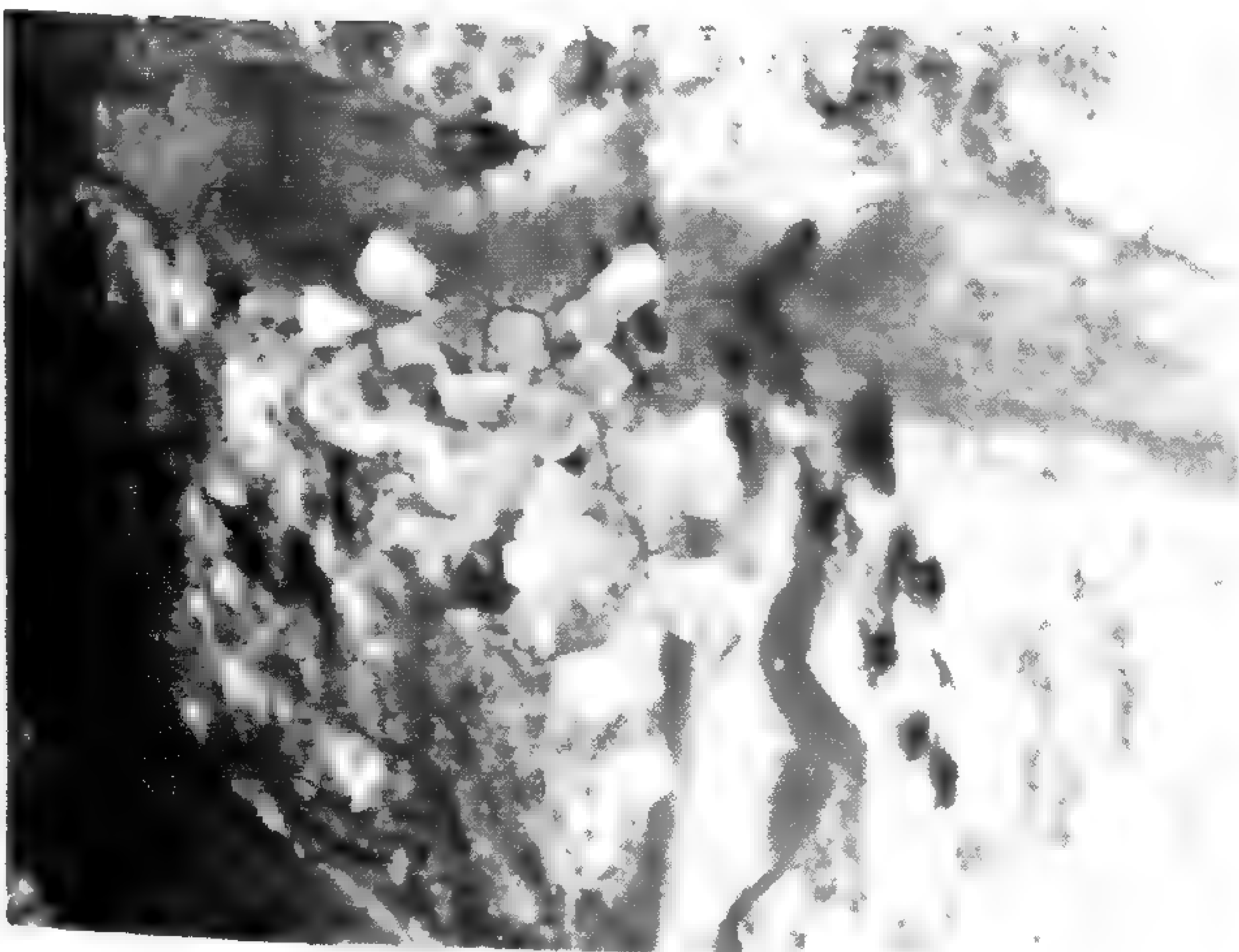


Fig. 1. *Adiantum capillus-veneris* in the porch of Landewednack Church.



Fig. 2. *Asplenium marinum* in the porch of Landewednack Church.



Fig. 3. The serpentine lectern with fern carving.



Two carved stone garden urns



Ferns at North Ferriby c. 1938. Front right *Polystichum setiferum* 'Wakleyanum' (now lost), background right *P. setiferum* 'Divisilobum' plus various cultivars of *Polypodium vulgare* agg., *Asplenium scolopendrium* and *Dryopteris*

Garden Visits

During the past year I had the pleasure of travelling to many parts of the country and one of the highlights of this travelling has been the viewing of quite a few ferny gardens and meeting members of our Society at their homes.

Most of the places visited were gardens open to members and are listed in the pamphlet of fern gardens which was sent to all members last January with the Bulletin, yet a couple of these owners told me that very few BPS members visit them. Why not make the effort - I'm sure that you will be made very welcome, and what better way is there to pick up some very useful hints and tips from the horticultural-minded members about the growing of a very wide variety of ferns in many different environments.

One garden, in particular, which I visited, in which there are some very nice plants, is not owned by a BPS member but he is related to the famous Bolton family and it was delightful to see some of the old fern collection and also some very old photographs of meetings, personnel and ferns from the turn of the century. Two very interesting features were some carved stone garden urns (see opp.) with fern motifs on each side which was made by one of the Bolton family who was a stone mason, and also a copy of one of C.T. Druery's book "Choice British Ferns". This was signed by the author and presented to Tom Bolton, one of the founder members of the Society.

I can really recommend travelling round to these places. It may be a bit tiring at times but it is very rewarding.

JACK BOUCKLEY

Ferns on Serpentine

We went to Cornwall to look at the strange *Asplenium adiantum-nigrum* that grows on the serpentine of the Lizard peninsula. But we couldn't resist hunting for some of the other ferns of Cornwall and so it was no surprise that three hardy pteridologists could be found making their way along the winding path down Rocky Valley towards the sea so that the continental one amongst us could see *Adiantum capillus-veneris* in the wild for the first time. Unfortunately, we had reckoned without the elements, and soon discovered that the 70 m.p.h. wind was bringing the sea to meet us - by the time we reached the coastal path we realised that our journey would have to be abandoned. Luckily for us the next day was more gentle, and we were able to scramble around serpentine boulders hunting for *Asplenium*, comparing fronds and checking spores in the bright sunshine, and in the excellent company of Rose Murphy.

Our last day was very wet. As we were staying near the Lizard we decided to chase the record of *Adiantum capillus-veneris* at Landewednack Church at the southern tip of the peninsula, not quite a "wild" site but better than nothing, we hoped. It was still raining gently as we walked around the church, searching high and low for any sign of fronds, but without success. Eventually we sought shelter in the church porch, and there, to our delight, we found not only *Adiantum* but also *Asplenium marinum* growing in the mortar (Figs. 1 & 2 opp. p.180). While the photographer busied himself with tripod and cameras, we explored the inside of the church. Some renovation work was in progress, and we were lucky to find the church warden present. He explained to us that the rather grotesque pulpit and columns on the font are Victorian additions, carved from the local serpentine rock, of which the local population is quite proud. The lectern is a more modest affair, also in serpentine with a polished central column but with something not too dissimilar to *Dryopteris affinis* (s.l.!) carved into the unpolished rock (Fig. 3, opp. p.180). It was a very fitting end to our hunt for serpentine ferns!

MARY GIBBY, ALISON M. PAUL, JOHANNES C. VOGEL,

POLYSTICHUM SETIFERUM 'PULCHERRIMUM' - THOUGHTS AND COMMENTS

J W DYCE, 46 Sedley Rise, Loughton, Essex IG10 1LT

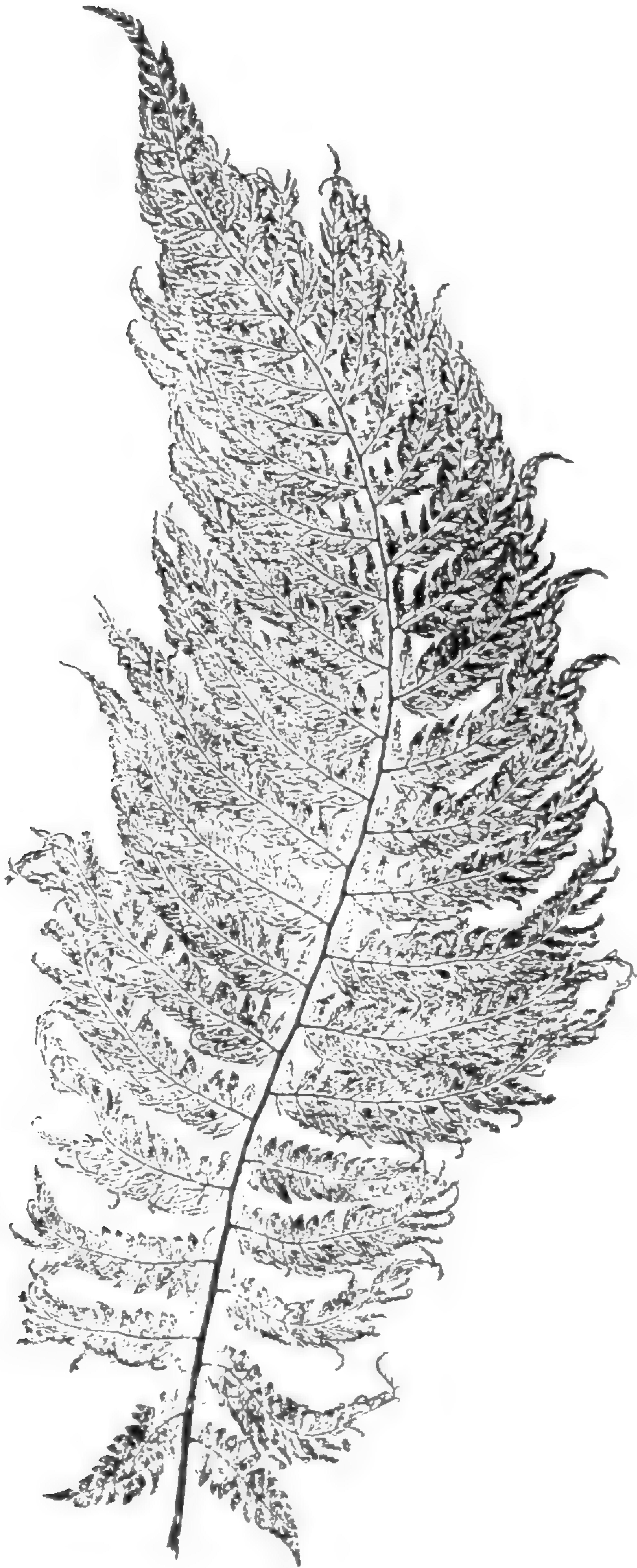
In the *Bulletin* for 1961, Vol.2, No.3, I contributed a paper on *Polystichum setiferum* 'Pulcherrimum'. Since then I have been devoting quite a lot of thought to this section of variation in *P. setiferum*, and why 'Moly's Green Pulcherrimum' still persists in surviving, although in near-normal form, unlike the other fifteen wild finds made in the sixties and seventies of the last century (the 19th), and the several raised from them by spores and prothalloid growths. They all, with one other exception, had very short lives.

The section is characterised by considerable lengthening of the pinnules, particularly the lower ones, into long, slender and falcate growths, deeply incised and often quite twisted, expanding at the tips and terminating in prothalli.

For the benefit of newer members I give a short description of the section and a brief recapitulation of its history. During the period mentioned above, sixteen plants of the variety were found in the wild in the south-west of England, where *P. setiferum* is the dominant fern species, in an area comprising Devon, Dorset and Somerset. Nine of these sixteen varieties were found by one man - J Moly, one of the most persistent fern-hunters of the period, the other seven by different finders - three by J Wills, one by C Jackson who was the first to find it "a few years before 1862" in South Devon, one by the Rev C Padley in North Devon, one by Padley's sister, Mrs Agar Thompson, in 1863 in South Devon, and one by Padley's gardener, J Smith, in South Devon. Moly's and Wills' finds were made in the border-land of the three counties. 'Pulcherrimum Thompson' was recognised to be by far the best find and I reproduce here the frond from the *Jones Nature Prints*. This frond also illustrated my previous paper in the 1981 *Bulletin* and our Editor suggested that I find another of the *pulcherrimum* varieties to illustrate this one. The only other pictorial record which appears to exist, apart from a few unsuitable photographs in the early issues of the *British Fern Gazette*, is also in the *Jones Nature Prints* - Moly's last find, in 1876, which has fronds not nearly so developed as 'Pulcherrimum Thompson'. I am therefore reproducing here the Thompson find again since it demonstrates best the qualities of the section.

None of these plants survived for very long, except two - 'Moly's Green Pulcherrimum' and 'Pulcherrimum Moly's Variegatum'. The former still grows in my garden and in Martin Rickard's, as well as in a few others. 'Moly's Variegatum' is known to have been in a few collections as late as 1933 but, apparently, did not survive for much longer. It was such an extraordinary variety however that it merits a description here. Both the *pulcherrimum* and variegated characters were constant. The young fronds were a normal green in colour but when fully developed the upper pinnules turned a pale yellow which deepened into a rich orange in the autumn, while the lower ones remained a vivid green throughout the season. The green remained to some extent in the veining of the upper variegated parts to give a fine pencilling effect. Unfortunately, with age the fronds became ragged and depauperate in their upper halves while the lower parts retained the *pulcherrimum* distinctness.

All the others had short lives - as *pulcherrimums*. Some collapsed and died early; the others were inconstant and gradually became more and more confirmed in their reversal to the normal *setiferum* species form. 'Moly's Green' has been the exception and is more resistant to permanent reversal. It still rewards us, but very rarely, with one or two pinnules, even whole pinnae, in the varietal character and, even more rarely, by part of, or the whole of a frond. The illustration shows a frond in full character, with the pinnules very finely divided and elongated, and their tips, along with the pinnae tips, extended into fine thread-like growths which, in many cases, expanded into prothalli (apical apospory).



Polystichum setiferum 'Pulcherrimum Thompson'

All this happened before our Society was founded in 1891, and consequently there is a great lack of information about it all. Druery had been active with his pen at the time and I hoped, for details to augment my information for this article, to find him giving vent to his fern enthusiasm by writing fulsomely about these exceptional varieties. To my great surprise - and dismay - there is, in the eight huge volumes of his press cuttings, not a single paper on the subject of the Pulcherrimum Section of *P. setiferum*. This lack of information can be explained, perhaps, by the very bad reputation the section had of reverting to normal *setiferum*.

Dr Stansfield confirms this lack in Volume 1 of the *British Fern Gazette*, 1912, when he writes (at the beginning of a long article on the *pulcherrimums*, the first to be published on the subject, but sadly lacking in detail) that the section has not been figured at all in any books or publications, with the exception, in the *Jones Nature Prints*, of 'Pulcherrimum Thompson' and Moly's last find of 1876. It is here that Druery does make some amends for his silence on the subject by reproducing Col Jones' notes on the section, along with the Print depicting Mrs Thompson's find, in his *British Ferns and their Varieties*, page 394. I am indebted to these notes to a great extent, as well as to the few papers, giving scanty information, appearing in the *Pre-Gazette Reports* of 1899/1905 and in the early volumes of the *British Fern Gazette*, for the details I am able to give here of the various finds.

My plant of 'Moly's Green Pulcherrimum', undisturbed for years, has produced about a dozen side crowns. I divided it last year and moved the crowns to a more convenient site, reserving the strongest one for installing in a pot so that I can give it more individual attention in an endeavour to persuade it to produce at least part of a frond in character. This plant is part of one which belonged to Dr Stansfield and with him, for many years, it produced a full complement of fronds in character. He gave a selected crown to his son-in-law, P. Greenfield, but with him it did not behave so well and varied from a very good *pulcherrimum* to almost normal *setiferum*. Eventually, this plant was passed on to me but has done no better, only occasionally showing a pinnule in character. Several years ago I gave an offset to our member, Richard Cartwright, and one year it produced for him a complete frond in character - one of only three times I have seen such a sight! To the uninitiated eye my plant looks like *completely normal setiferum*, BUT there is a subtle quality in the pinnules, very difficult to describe, which enables the fern-man, who is familiar with it, to recognise this unique variety.

Why did this fern variety suddenly appear in numbers in this small area of England, the West Country, for a short period of less than two decades? The whole area had been assiduously hunted by keen and knowledgeable fern-men for very many years **before** the 1860s, during the years of the *Victorian Fern Craze*, and many, if not most, of the old famous varieties of *P. setiferum* known to us had emanated from the area. If *Pulcherrimum* was there it would surely have been found. Then, suddenly, during a short period beginning in the 1860s, *sixteen* plants were found, nine of them by Moly. If one man, admittedly a super-hunter, could find so many, how many more were **NOT** found, tucked away in the more inaccessible places? Then they disappeared, just as suddenly as they had appeared. No more were found although the search continued as keenly - if not **MORE** so - than before, and we find Dr Stansfield writing in 1911 - "Fern hunters, wake up! It is now over twenty years since a *pulcherrimum* was found in the wild. The womb of Nature is inexhaustible and the seventeenth find may surpass all its predecessors". Another eighty-two years have passed since those words were written and **STILL** we have not found the seventeenth *pulcherrimum*!

Why is this so? Keen fern-men who know the fern and are familiar with the area where it was found - and that includes Martin Rickard and myself, and in the earlier post-war years my mentor, Percy Greenfield - have not been casual in their search for it,

but to no avail. The variety appeared suddenly - and disappeared just as suddenly! - Why? I have my own theory, which I am quite prepared to admit may be fanciful, to explain the phenomenon. We know that there are two areas in Britain which are more than ordinarily rich in variation among the local ferns - the West Country in the south-west, Dorset, Devon and Somerset, and in the north, the Lake District. Botanists try to explain this away by saying that the two areas concerned have been more intensively hunted than elsewhere, but this is not true - during the *Victorian Fern Craze* period the **whole** country was intensively hunted and in no other area did fern-hunters reap such rich harvests. What is present in those two areas which stimulates gene change in the ferns to produce mutant forms? Is it in the ground or in the air? It is possible the ground has something to do with it - but, certainly, **NOT** in the case of *P. setiferum* 'Pulcherrimum', else we would still be finding the variety in the West Country. Whatever it was - in the air? - it would appear to have had an influence on susceptible plants of *P. setiferum* over a short period of time to create a temporary gene change, and when the "influence" faded the plants reverted back to the species form. Was 'Moly's Green Pulcherrimum' "innoculated" more intensively and has not yet thrown off the "influence"? A bit of imaginative thinking, I admit, and the botanists will scorn the idea. - BUT, how can *they* explain it?

Meanwhile, we can only hope that, as Dr Stansfield wrote, "the womb of Nature is inexhaustible", and that whatever triggered the gene change which was responsible for the creation of the *pulcherrimum* varieties in *P. setiferum* will visit the West Country once more and enable us, again, to enjoy the excitement of finding this superlative fern in the wild.

BOOK REVIEWS

NEW FLORA OF THE BRITISH ISLES by Clive A. Stace. xxx + 1226 pp. 1992. ISBN 0 521 42793 2. University Press, Cambridge. Price £24.95 (\$59.95).

In the first 45 pages of this book you have a good guide to the ferns and allied plants (and their hybrids) in the British Isles. Descriptions are clear and are all you need to identify or confirm our British ferns. There are some very useful SEM pictures of the megaspores of the three *Isoetes* species, Transverse Section drawings of *Equisetum* stems and line drawings of alien ferns. But this is not all.

For British- and European-based pteridologists who also have a broad interest, however slight, in other vascular plants, this book is something you should have. How often, when botanising for ferns, do we come across a wild plant that is completely alien to our ken - and about which we want to know more. When we are studying the ecology of ferns that interest us, be they common ones like *Dryopteris carthusiana* or rarer species like *Cystopteris montana*, we are wanting to identify other plants that grow with them. This book will help you to do that with clear workable keys (as far as I can ascertain with limited use) and a number of illustrations by Hilli Thompson and photographs of detailed parts. Other British Floras have done this but not at this cost nor with such comprehensive coverage of both native, casuals and aliens plants. This is not just a compilation of botanical descriptions by a botanical journalist but a work that embodies the experience of many years of being an active research taxonomist, an enthusiastic teacher, and a practising field botanist.

A.C. JERMY

ATLAS ÉCOLOGIQUE DES FOUGÈRES ET PLANTES ALLIÉES by R. Prelli and M. Boudrie, Editions Lechevalier, Paris. 1992. Pp 272, about 200 b&w photographs on 124 plates, 175 x 240 mm. Laminated paper back binding. Price about £35 (subject to exchange rate variations).

It keeps getting better! After two editions of R Prelli's *Guide des Fougères et Plantes Alliées* we now have a superbly illustrated guide to the distribution of the fern and fern allies of France. The authors of this Atlas are to be congratulated for producing the finest photographic record of the ferns of any one country that I have seen for many years, and perhaps ever. Each species native to France, including Corsica, is illustrated so clearly that identification of even difficult taxa should be possible with very few errors. Divisions between species in *Dryopteris*, *Polypodium*, *Diphasiastrum*, *Asplenium*, *Botrychium* etc. suddenly become sensible even to the amateur! The addition of the first comprehensive distribution maps is an added bonus - each represents a tremendous amount of work; remember France is four times the size of England!

Unfortunately, only 2 hybrids are included, *Asplenium x alternifolium* and *Equisetum x moorei*; this is, presumably, a sacrifice to practicality as so many other hybrids are too rare, or extinct, to locate and photograph in the wild. Their inclusion would also have pushed the price of an already expensive book out of sight.

For me there is only one questionable feature of the book. That is the arrangement of the genera by habitat; instead of by the standard systematic arrangements, however, this is a personal preference and I do realise there are strong arguments in favour of the system chosen here.

I suggest anyone with an interest in wild European pteridophytes should buy this book. The text is in french, but all, bar one or two, of the native British species are included. It is therefore possibly the best photographic record available of *British* ferns.

MARTIN H. RICHARD

THE CULTIVATION OF FERNS by Andrew McHugh. Pp. 144, 48 col. plates with additional line drawings, 1992. Batsford, London. Price £25. ISBN 0 7134 6492 5.

Over the last few years we have seen quite a few fern books appear which have been written by horticulturists rather than fern specialists. The resulting volumes are readable and full of many useful ideas, but sadly can sometimes be rather unreliable at a factual level. This book is no exception. It is beautifully illustrated and well laid out but the inaccuracies negate its value as a reference book. When you see statements you know to be wrong, eg. *Asplenium septentrionale* likes a calcareous soil or *Blechnum penna-marina* is not hardy at temperatures lower than 5°C, it dents your trust in other statements in the book. Similarly, spelling mistakes are common, eg *Alsophyla* for *Alsophila*, *Pellaea* for *Pellaea*, *claytonia* for *claytoniana*, *Salvinea* for *Salvinia*, *arbora* for *arborea*, *nipponicum* for *niponicum* and *thelyptroides* for *thelypteroides* - and these all appear on one double page spread (I've used the *Encyclopaedia of Ferns* by David Jones as the reference authority). Fundamental details in the reference sections at the back are often wrong. For example, we are told the American Fern Society's *Fiddlehead Forum* is issued four times a year whereas, actually, it is six, while the BPS is credited with only two journals annually instead of three.

I don't doubt there is a great deal of valuable material in this book but I am afraid it is interspersed with too many inaccuracies for me to be able to recommend it.

MARTIN H. RICKARD

REPORT OF THE CENTENARY FERN COLLECTION UNIVERSITY OF BIRMINGHAM BOTANIC GARDENS AT WINTERBOURNE

BRENDA & RAY SMITH, 184 Solihull Road, Shirley, Solihull, Warwicks, B90 3LG

Winterbourne House was built in 1903 by J.S. Nettlefold (of Guest, Keen and Nettlefold), and the seven acres of garden was laid out by his wife Margaret (nee Chamberlain). They owe much to the landscaping styles developed by Edward Lutyens and Gertrude Jekyll at the beginning of the 20th Century. The property was later owned, and other features added, by John Nicolson (of Bell, Nicolson and Lunt) who bequeathed the house and gardens to the University of Birmingham in 1943.

The Gardens (now the Botanic Gardens) were managed by the Department of Plant Biology but since 1989 have been maintained by the School of Continuing Studies whose headquarters are at Winterbourne House. They include many features of botanical and horticultural interest and act as a focus for the horticultural teaching courses provided by the School.

A Friends Association was founded in 1989 and the Chairman Emeritus Professor Jack Hawkes approached us in 1990 with the idea of planting a new fern border in the gardens to complement the ferns already established which, while limited in variety, included a fine collection of *Osmunda*, *Dryopteris*, *Gymnocarpium dryopteris*, *Asplenium scolopendrium* and *Azolla*. There is also a small collection of *Adiantum raddianum* and *Cyrtomium falcatum* in a heated greenhouse, keeping company with a collection of orchids.

Discussions then took place with the BPS Secretary, Matt Busby, other Midland Group members and the Staff at Winterbourne, and agreement was reached on a suitable area, which needed a considerable amount of work done in preparation. The staff worked extremely hard over the winter of 1990/91 and by the spring had cleared a substantial area of low ground, including the unenviable task of lifting bamboo and laying paths to make the area accessible.

In May 1991 a working party consisting of Alan Ogden, Margaret and John Collins and ourselves congregated at Winterbourne and the task of planting out the fern border commenced, using specimens provided from our own collections. Soon plants were being provided by others in the Society and planting continued through the summer, culminating in a Midland Group meeting there on the 1st September when with popular acclaim, the collection was officially named the "Centenary Fern Garden", commemorating the Society's 100th anniversary. (*BPS Bulletin* Vol. 4 No. 2 p. 79).

Since this time the Winterbourne staff have also cleared a small sheltered area adjacent to the greenhouse, which during the year has been planted up with "wintergreen" ferns, namely, polypodiums, scolopendriums and polystichums, which is proving an attractive addition and gives visitors something to see whatever the time of year.

The joint collection now consists of some 30 or so British and Foreign species and subspecies, including some that originated as a result of Christopher Fraser-Jenkins' visits some years ago to Mosman Peak, Jamaica and Leborg, Darjeeling. There are also over 50 varieties of fern and there is room for more. Donations are more than welcome although we have now reached a stage where we will need to be more selective to avoid duplication. The Secretary has a comprehensive list of the Gardens' fern contents for anyone interested in adding to the collection.

Grateful thanks are due to the following for their contribution in terms of work done, provision of plants, interest and support:- Clive Brotherton, Matt Busby, Margaret and John Collins, Nigel Hall, John Mashiter, Vic Newey, Alan Ogden and the garden staff, and also to Professor Jennifer Tann, Head of the School of Continuing Studies, and Emeritus Professor Jack Hawkes (currently President of the Linnean Society).

The fern collection can be seen by Members of the B.P.S. on weekdays between 10 am and 4 pm, by prior arrangement with the garden staff at Winterbourne, on 021 414 5590. The Gardens (not to be confused with Birmingham Botanical Gardens) are also listed in the B.P.S. Guide, *Where to see ferns*, and are located at Edgbaston Park Road, Edgbaston, Birmingham, B15 2RT.

THELYPTERIS PALUSTRIS IN THE PEAK DISTRICT

IAN D. ROTHERHAM and PAUL A ARDRON, Museums Dept., City Museum, Weston Park, Sheffield S10 2TP

Marsh Fern (*Thelypteris palustris*) has been discovered in the Peak District National Park near Sheffield. Although the area has been well worked by botanists for more than a century, this species has never before been found. Indeed the present discovery was a chance find, the by-product of a detailed ornithological survey of the moor. The surveyors' attention was drawn to a particularly interesting flush with extensive and dominant Greater Tussock Sedge (*Carex paniculata*). Close inspection indicated that this was a particularly rich community with species such as Marsh Marigold (*Caltha palustris*) and Ragged Robin (*Lychnis flos-cuculi*). Such a community is very scarce in the eastern Peak District, and those sites which do occur are often in poor condition due to drainage and over-grazing. It was decided to re-visit the site later in the year.

This further visit was made on 11 July 1991, with the specific purpose of recording plant communities and producing detailed species lists. The fern, *Thelypteris palustris* was found in an area of around 30m by 50m. The community in which it was growing was made up of Marsh Marigold, Ragged Robin, Lesser Stitchwort (*Stellaria graminea*), Common Spotted Orchid (*Dactylorhiza fuchsii*), Bogbean (*Menyanthes trifoliata*), Marsh Bedstraw (*Galium palustre*) and a variety of Sedges (*Carex* sp.) and Rushes (*Juncus* sp.). In total, around 40 species of flowering plants and ferns were recorded from this one small area. The ferns included *Dryopteris dilatata*, *Athyrium filix-femina* and *Dryopteris carthusiana*.

This location for Marsh Fern is particularly interesting in terms of the species' national distribution. Its headquarters are in the Norfolk Broads of East Anglia with scattered locations in Wales and the Lake District, along with former sites in the meres of Shropshire, Cheshire and Lancashire (Jermy *et al*, 1978). Many of the latter have been lost to drainage and/or peat extraction. The nearest occurrence to the Peak was Thorne Moors, but it has not been recorded there for many decades and is assumed lost to peat cutting (Limbert, 1989).

Extensive surveys of the eastern Peak District over a ten year period have produced many interesting finds. However, *Thelypteris palustris* is perhaps the real gem. Finds such as this, together with recent work on vegetation history, suggest that this may be a tiny remnant of what were formerly much richer and more extensive wetland communities than are now found. This may present a somewhat different view of Peak District vegetation than previously envisaged, an exciting possibility which requires further work. However, pockets of diverse or uncommon plant communities now being found in the Derwent and Ewden Valleys (both in the eastern Peak) would support this suggestion. If this is the case, then it would further emphasise the catastrophic changes that have followed human impact over the last four thousand years.

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HENRY SEEBOHM – A 19th CENTURY PTERIDOLOGIST

M.J.P. SCANNELL, Raglan Road, Dublin 4.

Henry Seebohm (1832-1895) was a noted ornithologist. He published the *History of British Birds*, the *Birds of the Japanese Empire* and other works. He contributed to *Ibis* and the *Zoologist*. He appears however to be unknown as a botanist and is not mentioned by Desmond in *Dictionary of British and Irish Botanists and Horticulturists* (1977).

In 1851 Henry Seebohm made a significant contribution to fern studies in West Galway (Vice-county H 16). During a visit to James Ellis, a Quaker landowner who lived at Letterfrack (L75), he climbed Bengooria (Diamond Hill, 1460 ft), engaged in 'fox-shooting', and studied ferns. He published, 'List of ferns found in Connemara' in *The Naturalist*, 1 (1851): 220-222. The list is 'remarkably complete'. In the *Flora of Connemara and the Burren* (Webb, D.A. and Scannell, M.J.P.) thirteen of the 29 species are noted as the first records for vice-county H 16. Seebohm stated that he 'gathered' most of the specimens 'within a mile of the residence of James Ellis at Letterfrack'. The area - SW of Killary Harbour is of varied terrain - low-level blanket bog, lakes, rocky headlands and many sea inlets. The records are *Botrychium lunaria*, *Athyrium filix-femina*, *Dryopteris filix-mas*, *D. dilatata*, *D. carthusiana*, *D. aemula*, *Oreopteris limbosperma*, *Phegopteris connectilis*, *Equisetum telmateia*, *E. arvense*, *E. sylvaticum*, *E. fluviatile* and *Isoetes lacustris*.

Recently a specimen was uncovered in *DBN* herbarium, National Botanic Gardens, Glasnevin. The label is hand-written (Seebohm?). It reads,

Lycopodium inundatum L.

on a margin of a small lake the property of James Ellis, Esq near Letterfrack, Connemara. Henry Seebohm Esq. 1855.

The lake in question may be Bunnaboghee Lough, situated on the north side of T71 in L7151. The date on the specimen indicates that Seebohm made a further visit to Letterfrack. The roadside shore of this lake was worked by me in the course of work for the *Flora*; a more detailed study may reveal the lycopod in L56. There are records for Altnagaighera L76 and for Inishbofin L56.

Henry Seebohm states that he 'gathered' specimens, so he may have preserved a collection of plants. Most probably these specimens are in a British Midlands herbarium.

Henry Seebohm was a businessman. He was born in Bradford on 12 July 1832 of parents who had come to England from Germany in 1815. Early in life he settled in Sheffield where he founded a successful steel company - Seebohm and Dieckstahl. He died in London on 26 November 1895.

SHORTER NOTES

Deformed Ferns

Referring to Miss Primrose Peacock's article (*Pteridologist* 2, 3, 1992) and based on my own observation, I endeavoured to examine the cause of the deformation.

Last July, during an excursion to the Maasvalley in Southern Belgium, I found on the roadside in Romedenne a mixed population of *Dryopteris filix-mas* and *Athyrium filix-femina*. All *Dryopteris filix-mas* plants showed normal growth, whereas some *Athyrium filix-femina* fronds had frizzled ends. I first thought that the use of herbicides might be the cause of the deformation, but this assumption seemed unlikely since the *Dryopteris filix-mas* fronds were not affected.

I learned from the *Athyrium filix-femina* ethology in *Flore Generale de Belgique, Pteridophytes* (1950) by A. Lawalree, that the fronds may be damaged by the *Chortophila signata* fly.

The description of the damage matches with Miss Peacock's photography, and the herbarium material I gathered. A white-yellowish larva lives inside the deformation. In support of this theory I asked the Entomological Department of the Belgian Institute for Natural Sciences to analyse the deformed ferns. They confirmed that the deformation was caused by the *Chortophila signata* fly.

The above proves that a common fern like *Athyrium filix-femina* can still fascinate us.

(I am grateful to Mr. P. Dessart of the Entomological Dept. of the Belgian Institute for Natural Sciences, for his help in determining the *Chortophila signata* damage).

WIM TAVERNIER

Secret Door

Cystop
 What your doing
 And see how the crevice
Pteris
 In the crack
 And *fragilis*
 As a summer breeze
 Bends the slender dark rachis
 Twists the light feathered fronds
 And holds you enchanted
 By a schizophrenic rockface
 Of feather and stone.

If one feather was plucked
 And with it a message
 Quilled on the stone face
 I imagine its letters
 Would be magical runes
 Illuminated only
 By the pale silver light
 Of a crescent new moon
 Revealing a chant
 The musical key
 To a secret doorway
 In the cold grey cliff.

GAVIN STARK

POEM

I scorn the doubts and cares that hurt
 The world and all its mockeries
 My only care is now to squirt
 The ferns among my rockeries

GEORGE SIM 1847-1922 (submitted by PAT ACOCK)

FERN ANDY of CUMBRAE

JAMES W MERRYWEATHER, Biology Dept., University of York, Heslington, York, North Yorks. YO1 5DD.

A few miles north of Arran in the Firth of Clyde are two small islands, Wee and Great Cumbrae. The smaller, a lump of basalt lava-flows created by Arran volcanoes in the early carboniferous era, is essentially uninhabited. In contrast the larger island (a much more complicated geological marvel) is a popular holiday centre, sadly now in decline but, in Victorian times this was where the well-to-do of Glasgow would take their recreation, having travelled "doon the watter" by paddle steamer. The charming little town of Millport with its sandy beaches and rocky coves would throng with holiday makers who, as today's tourists, required ready supplies of ice-cream (still famous there today), mineral waters from the "spa" at Fintry Bay, and souvenirs. The last included ferns - most species are today still plentiful on the island - and a renowned supplier was Fern Andy.

A photograph of him is in the collections of the local museum (Fig. 1) and on the back we are told as much as is known of him:

" 'Fern' Andy Sullivan stayed between Targets towards Fintry. It wasn't really a cave, just an overhang (canvas down front). He served in the American

army when he was young. He had two cats. He sold the ferns in little baskets that he made and decorated them with Acorns, fir cones etc. (He sold them in town). Boys did shopping for him and when they asked for a pennyworth of broken biscuits they got double amount."

Until a few years ago Fred Jackson used to visit his daughter on "Coombray" as he called it, and he reckoned to know every fern there. I've been going there on and off since I was four, indeed I've been to this little paradise sixteen times in the past seventeen years, and I feel I can now make a similar claim. To my great regret, I was never there at the same time to share the island with Fred.

Andy has left most of the ferns, as far as I can tell, for most species that should be there are there. The list is impressive for an island only 11 miles in circumference: *Asplenium trichomanes* spp. *quadrivalens*, *A. ruta-muraria*, *A. scolopendrium*, *A. adiantum-nigrum*, *A. marinum*, *Polypodium vulgare*, *P. interjectum*, *Dryopteris filix-mas*, *D. dilatata*, *D. carthusiana*, *D. aemula*, *D. affinis* (the sub-species need doing properly), *Athyrium filix-femina*, *Pteridium aquilinum*, *Oreopteris limbosperma*, *Blechnum spicant*, *Polystichum setiferum*, *Osmunda regalis*, *Hymenophyllum wilsonii* (two rocks-worth), *Ophioglossum vulgatum* (a small patch, currently lost) and one plant of *Phegopteris connectilis*. The *Osmunda*, a reasonably common plant of Arran, survives as one specimen, which is turning into several as it ages, just above the eastern shore. In 1976 there were hundreds of small plants on the newly built walls of the upland "loch" (reservoir) known as Minnemoer. The walls are now invisible, the bank vegetation having grown over and covered them. The Ossies have gone, but isn't that a normal habit of young *Osmunda*, to colonise temporarily a habitat only fit for small plants? There's also *Equisetum arvense*, *E. palustre*, *E. fluvialtile* and *E. x litorale*.



'Andy at home'

The richness of the Cumbrae flora is obvious in June and July when the flowers of so many species decorate its shores and hills. The orchids are always popular with the students we take there (for marine biology!) and no wonder, when the three common *Dactylorrhiza* species (*D. fuchsii*, *D. maculata*, and *D. purpurella*) hybridise and back-cross in spectacular swarms at several sites. But, in the main, un-noticed, are the sedges. Britain has just over seventy species, many rare or local. Great Cumbrae has twenty four of them!

I shall be back next year as usual. I just love the old-fashioned, nearly-Hebridean atmosphere of the place and I'm confident that I'll be surprised by the botany again - I may even find a new fern just to prove I don't know them all individually.

I would like to thank Kathryn Valentine of the Cunningham District Museums Service for providing a copy of the photograph of Fern Andy.

GIFT OF FERNS FROM ROYAL LEMKES FOR BPS CENTENARY 1991

JOHN WOODHAMS, Tropical Section, Royal Botanic Gardens, Kew, Richmond, Surrey.

The Royal Botanic Gardens at Kew took delivery of a consignment of hardy ferns in September 1990 donated by Hans Lemkes and grown on the nursery of Lemkes and Zonen in The Netherlands.

The ferns, some 48 named species and cultivars, were offered by Royal Lemkes on the understanding that they should be set out in a suitable location to commemorate the centenary of the British Pteridological Society. Word of this generous offer was conveyed to Clive Jermy at the Natural History Museum by Bert Hennipman at Leiden and following discussion concerning a suitable location for the plants to be displayed, RBG Kew was eventually decided upon as offering security and longer term benefit.

It was agreed the plants should arrive at Kew in Autumn 1990 having been potted on into 5 inch pots at the nursery in Holland especially so that they should attain good size for display the following year. Ten plants of each of the 48 taxa requested arrived in marvellous condition, conveyed by lorry the plants packed in waxed card boxes. All were unpacked and transferred to cold frames where they were held overwinter.

A border site adjacent to the Filmy Fern House at Kew was selected as a suitable display area for the plants. Peter Bradley, Supervisor of the Fern Unit and his staff set-to, to clear some of the nondescript shrub items from the site following which the area was dug over. The border faces north and some shrub cover was left especially at the back to give shade for at least part of the day and to provide more cover for some elements of the collection. The plants were set out mostly in groups of five in March/April 1991 and mulched following planting with a liberal dressing of composted horse manure. A thorough watering was given to the whole area and a set of three water sprinklers purchased so that water could be applied as and when necessary through the summer.

With few exceptions the plants settled in extremely well and generated much interest and discussion during the afternoon tours by delegates to the BPS Centenary Symposium middle day spent at Kew.

It is interesting to report that growth of many of the plantings has been such that division and replanting, taking in more space, was carried out during autumn 1992 and now in March 1993 cleaning and remulching work is in hand to prepare the area for the new growing season. Through the very generous donation of this collection by Hans Lemkes to celebrate the BPS Centenary year, Kew now has a specific area where our visitors can appreciate something of the form, colour and garden potential of hardy ferns.

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THE
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PTERIDOLOGIST

Edited by
JAMES MERRYWEATHER



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The BRITISH PTERIDOLOGICAL SOCIETY was founded in 1891 and today continues as a focus for fern enthusiasts. It provides a wide range of information about ferns through the medium of its publications and available literature. It also organises formal talks, informal discussions, field meetings, garden visits, plant exchanges, spore exchange scheme and fern book sales. The Society has a wide membership which includes gardeners, nurserymen and botanists, both amateur and professional. 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, *Pteridologist* topics of more general appeal and the *Bulletin* Society business and meetings reports.

Membership is open to all interested in ferns and fern-allies. **SUBSCRIPTION RATES** (due on the 1st January each year) are Full Personal Members £12.50; Personal Members not receiving the *Fern Gazette* £9.50; Student Members £7; Subscribing Institutions £20. Family Membership in any category is an additional £2. Applications for membership should be sent to the Assistant Secretary (address above) from whom further details can be obtained. (Remittances made in currencies other than sterling are £3 extra to cover bank conversion charges). Airmail postage for all journals is an extra £4, or for those not receiving the *Fern Gazette* £2.50.

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, from whom further details can be obtained.

EDITORIAL

GARDEN LIBRARY,

Less than a year ago, in May 1993, I paid a brief visit to the Rickard household and, when I left, I had apparently agreed to take over *Pteridologist*. At the time I was quietly confident that Martin would never really foster his baby into the care of another but, within days, congratulations from Clive Jermy arrived and I was soon receiving instructions from our ever vigilant secretary! That mute nod in the kitchen at Leinthall Starks when Martin sheepishly (mmm, that's not a predictable Rickardian trait, is it) suggested I'd make a good editor, had dropped me right in it.....deep.

The new editor's Christmas holiday was not a happy one. He had not enough copy, couldn't knuckle down to the job and, it being his first BPS publication, hadn't got a clue how it was to be done anyway. He hadn't lifted a finger since collecting copy in September, so Christmas itself was a time of wretched guilt. As soon as the bank holidays were over the work simply had to begin: letters were written and the long task of pumping words into the computer began. Fortunately most authors whose copy looked computer-generated sent floppy discs and the task became easier, but there were still pages and pages of type-script and (worse) hand-writing to transfer.

Early this morning before work, with a busy Good Friday in prospect tomorrow, I have just completed the last of the articles. The format (mimicking last year's edition) was designed some months ago, so now I simply pour the text in from word processor to desk-top publisher*, make it all fit, complete the contents page and off it goes to Metloc on a floppy disc for printing. I'll enjoy this last bit, actually making *Pteridologist* on the computer, watching all that raw text "flow" from box to box, page to page (.....oh, the delights of DTP*).

To make the task easier next time I ask those who can to follow the guidelines laid down in *Instructions to Authors* on page 230 of this edition. However, it's good ferny articles I need, so if your best comes scribbled on the back of an envelope, I'll not turn it away.

Pteridologist is my favourite of the three BPS journals and what I particularly like about it is the huge diversity of subject matter covering all things pteridological, with both botanical and horticultural viewpoints. I intend to encourage articles which bridge that unnecessary artificial divide, promoting my conviction that natural history, scientific and popular, belongs to all. Of course the excellence of past *Pteridologists* has been the result of the hard work and enthusiasm of its first editor Martin Rickard who has rightly been congratulated many times already for their quality. However, that was so well deserved that I do not hesitate to reiterate: "well done, Martin, and thanks from us all".

JAMES MERRYWEATHER

FROM THE PRESIDENT

How time flies. It does not seem more than a couple of months since the last *Pteridologist* was issued. Since then I have continued to get round various gardens up and down the country and have found them to be very interesting with such a wide variety of ferns and other plants, British and foreign. Many thanks to those who have made me so welcome and also, thanks to those who have called to see my collection at Harrogate.

The society continues to grow in spite of the recession during which many societies have suffered severe membership losses. Our success is partly due to increased media attention. There is no doubt that such publicity does much good for the society, but it is still important for all individual members to sell pteridology to the public. May I repeat what I said in 1991:

Mille ante bis millimum annum

If each member responds to my call during our centenary year and introduces one new member to the society before the end of 1999 - the turn of the century - we can increase membership to 1,000. While I am on the subject of increased membership, is your partner a member? Joint membership costs only an additional £2 per year. Have you ever thought of giving a year's membership to a friend or relative as a birthday or Christmas present? Simply send in a completed membership form and remittance six weeks before the membership is required to start. Clearly mark it *Gift Membership* and the society will do the rest. The 1993 secretary's report introduced a new *I'd like to know* service, through which queries about all aspects of pteridology can be answered quickly by the best possible authority. Do make use of this service. Full particulars are in the 1993 *Bulletin*.

Now may I express a personal thank you to Martin Rickard, retiring editor of *Pteridologist* who introduced this journal in 1984, for all the work he has done in getting the first nine issues out, full of interesting material. I also welcome James Merryweather of the University of York as the new editor. He will need plenty of copy for future issues and the ball is in your court. Let's have reports of your experiences, experiments, successes and failures.

So, best wishes to all for the coming years.

JACK BOUCKLEY

HOW DO YOUR SPORELINGS GROW?

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A number of members tell me they have problems after transplanting their sporelings. So did I at one time, but I seem to be getting better at it now. Perhaps others will find my experiences useful.

We have to face it, many kinds of fern are delicate at this early stage. Our native *Athyrium* and *Dryopteris* are pretty resilient and are good material to start on - then the goodies of the spore exchange beckon us on. Some of them turn out to be less co-operative. Having spent a lot of time over the years dabbling with seeds and seedlings of the more obscure flowering plants, it seemed that some of this acquired expertise was worth trying out on ferns. Experimenting fairly intensively over the past seven years has brought worthwhile results. As usual, a study of the plant's life history and physiology gives the best clues.

The reasons for failure must be numerous, but here are a few of them, starting with the most obvious:

1. Too little water (watering or kind of compost).
2. Too much water (watering or kind of compost).
3. Damage to tissues during transplanting - and subsequent fungal infection.
4. Airless compost - usually associated with too wet compost.
5. Too hot or too cold.
6. Lack of light, especially in winter.
7. pH wrong.
8. Change of regime after transplanting (temperature and humidity).

Watering, or lack of it, must be the usual cause of major disasters; it is for me. It's easy to forget, even when you are around all day, for there are plenty of diversions going on,

especially in spring and summer. I try to have a look around my propagating case and greenhouse every evening to top up anything near gasping, and then give an overall watering each morning. Most higher plants give clear signals of water stress by drooping. Ferns seldom do, except for young growing fronds, and quickly pass the point of no return. Worse still, even with the growing point dead, the fronds may take months to die, and we hang on to them in hope - seldom justified. Most ferns don't seem to have developed the knack of forming adventitious buds or coping with airlocks in their plumbing.

There are ways of extending the period without watering, for plastic seed trays without holes may be obtained. I line these with capillary matting, the thicker the better. A tray takes 20 x 2" or 15 x 2½" pots or 5 bedding plant strips. A full soak will last 2-3 days, even in summer. The water is also evened out if you have different sized pots in one tray. There is a risk of too much water collecting - check by lifting out a pot now and again, and pour out any surplus. Leave them to dry off for a couple of days.

You can extend the period without watering even longer if you want to go away but it is risky, even with some of the sophisticated equipment available nowadays. The simplest and, perhaps, the most reliable is to have shallow containers of water close by your trays with a 1" wide wick of capillary matting leading into them. The water level needs to be an inch or so below the bottom of the trays or they will waterlog. Two litre ice-cream containers are ideal. Even your willing, but horticulturally clueless neighbour can manage to maintain a water level. To be on the safe side a ½" x 1/8" bit of matting half poked into the bottom of the pot will ensure moisture flow. Some ferns, most *Polystichum* for instance, are sensitive to overwatering so, as a precaution, I put in enough 3/8" gravel to cover the bottom of the pot so that there is always some air, even if they get waterlogged.

The compost for pricking out and potting sporelings is closely tied up with watering. It needs to be water retentive certainly, but what is underappreciated is that it needs to be well aerated as well. In my experience the popular peat composts tend to finish up as an airless lump, and they contain fertilisers which sporelings cannot tolerate. I make up my own from equal parts of good garden soil (veg. garden), garden compost for nourishment, peat to hold water and coarse concreting sand to hold the constituents apart. I put this through a relatively coarse ½" sieve - finer compost holds less air. I find that the *Vapo* peat in orange bags is by far the best; pure sphagnum. At this stage you should think of the pH too. If sporelings are pale without good reason (starved or waterlogged) it usually means that the compost is too acid or too alkaline. A pH of 6-7 will accommodate most, but be prepared for surprises. My indicator solution is in constant use. Checking newly-made compost is not reliable, for it changes over a few months with watering. Peat is very acid but this may be countered by your soil or sand if they are alkaline. If they are acid too, fine limestone grit or ground limestone needs to be added, up to a level desertspoonful in a black plastic bucketful. Check some from a pot after about three months and make a note of it for next time. If the soil mix is very acid sprinkle some ground limestone over the surface in the pots and water it in. But don't let me put you off. pH is not usually vital, it's just better if you get it right. You should finish up with a compost that is just moist, but not sticking together. It is easier to use in that condition but, again, not vital.

When it comes to pricking out from a potful of prothalli, loose compost at sowing time is advantageous. It is easier to separate plants without root damage. You can do this when they have one, two or three leaves but, as with most seedlings, the longer you leave them, the more root damage will occur. This is something that young ferns find particularly hard to recover from. Young plant tissues are delicate. A root is no more than several strands of very thin cellulose bubbles end to end, and relies on the surrounding earth to keep its shape. Without its support at transplanting they bend, kink squash or

break and become useless to the plant. Those who are familiar with these things under the microscope will know what I mean.

If your potful is large and sporelings well spaced, it may be best to dig out deeply with the thin end of the gardener's "widger" or the round end of a table knife, leaving remaining prothalli to grow on. If thick in a small pot as mine usually are, turn out the pot and pull the cluster apart into progressively smaller pieces, eventually into single plants. It helps to have the potful rather dry so that the compost falls away easily. Any worthwhile clusters of prothalli can be put back with the old compost and will soon settle down after an overhead spraying. Keep your removed sporelings from drying out too. It only takes a few minutes for exposed roots to dry out and become damaged.

For these very tiny plants a pot is a waste of space and compost. I use *Plantpak* bedding strips which hold a dozen or more sporelings and fit five to a tray, a lot more convenient for small quantities than pots or whole seed trays. Don't forget to have lots of little labels ready. There may be only a few of some kinds of sporeling, and some sorts look very much alike as babies. To plant without kinking the roots use a widger to make a slit about 1½" deep and lower the roots in gently. They may be far longer than 1", in which case let them fold over in a figure of eight to avoid kinks, and then close the slit. Don't firm. Put these back in the same place that they came from, spray lightly and cover with polythene, but don't water. After 2-3 days give a light watering but keep the polythene on for about 10 days. The reasoning here is that some root damage is inevitable and wet conditions (i.e. watering) are likely to encourage pathogens to develop on the damaged parts. Give a day or two to heal and watering may be resumed. There is another reason: all fern roots, as far as we know, are mycorrhizal, i.e. they have a symbiotic relationship with soil fungi, a device for enhancing nutrient uptake from the soil. These fungi develop best under well-aerated conditions¹.

After a month or two the sporelings will have 5-7 leaves and will want moving into 2" or 2½" pots before their roots get tangled. I turn the strip on its side, gripping the leaves gently, and ease the block out. The plants usually separate easily. Scoop out half a potful of compost, give it a little shake whilst at 45° and it will form a flat face on which to lay the roots. Fill up loosely without firming, spray mist gently and cover with polythene again. Water after 2 or 3 days as before.

Once the pot is filled with roots it can be treated as a normal plant and potted up in whatever you fancy. I use the standard soil-based John Innes style of compost. Straight fertilisers seem to damage tiny plants, and I find the slow release (6 month) granule fertilisers good, keeping a fern going far longer than old style ones. A level desertspoonful in half a bucket of compost seems right.

There are still a few other pitfalls. Even a well shaded greenhouse can overheat in summer. 90°F is about as much as sporelings can stand, and not too often. A cold frame in a shady place with a temperature of 60-70°F is about right in summer. At the other extreme, in autumn and winter, cold and decreasing light will send hardy ferns into "hibernation". Subtropical kinds will develop brown patches on their leaves and quietly give up, so don't try transplanting between the end of September and end of March unless you can give them a good deal of strong artificial light and a little heat to keep them growing.

Most prothalli are in the same compost for 6 months or more and it is difficult to devise a compost that can supply plant nutrients over so long a period in the very small quantities needed. As the fronds appear the demand becomes greater and available food decreases. A very weak cucumber feed (high nitrogen) at about a quarter strength will keep them green and growing. For transplanted babies, use a stronger mix. I use a small pipette and apply directly to a sprouting prothallus.

¹ If your compost is sterile it will not contain any mycorrhizal fungal inoculum. The addition of 10% live garden soil (or soil from where your fern naturally grows) should supply a diversity of suitable fungal propagules to encourage mycorrhiza formation - ed.

Another problem, which affects plants generally in a damp, still atmosphere is grey mould (*Botrytis*) which spreads fast. The safest fungicide I have found, even for prothalli, is *Benlate*, but it loses its potency after a few days and has to be made up fresh when required. Tipping the packet into a small test-tube and marking it with graduations so that one can remove enough for half a pint at a time is useful. Cheshunt compound does not seem to have the slightest effect on damping off of sporelings. The commercial preparation *Elvaron* worked, but the foliage browning, which appeared about two weeks later, took quite a bit of working out! Oh, why do we bother?

SHORTER NOTE

Asplenium trichomanes ssp. *trichomanes* ("Incisum" group)

During the BPS meeting in the Massif Central in France last summer the subspecies within the *Asplenium trichomanes* complex were discussed at length. At one stage I asked Michel Boudrie if the very rare variety "Incisum" had ever been found in France. To my surprise Michel immediately remembered 2 or 3 recent records, and that at least some plants had been fertile.

Michel very kindly offered to send me a frond from his herbarium to see if I could harvest spores. Before it arrived I wondered if it might be of the rather coarse "Incisum Moule" type, but I need not have worried, for it turned out to be a beauty. It was perfectly incised like "Incisum Greenfield" - see *Pteridologist* 2, 65 (1991). Michel's frond (Fig. 1) has some damaged pinnae, but I do not believe this is a sign of depauperation, but rather a reflection of damage in the post or during spore collection.

The frond was collected from acid rocks close to Berbézit, 9km south-west of La Chaise-Dieu, on 27th March, 1991 by B. Vigier.

There are six recorded finds of this variety in the British Isles since 1743, yet in France there have been 2 or 3 recent finds without any comparable interest in fern variation. It does raise the question, how common is this and other varieties on the other side of the Channel? Next time I'm in France I'll be looking more carefully....!

MARTIN RICKARD

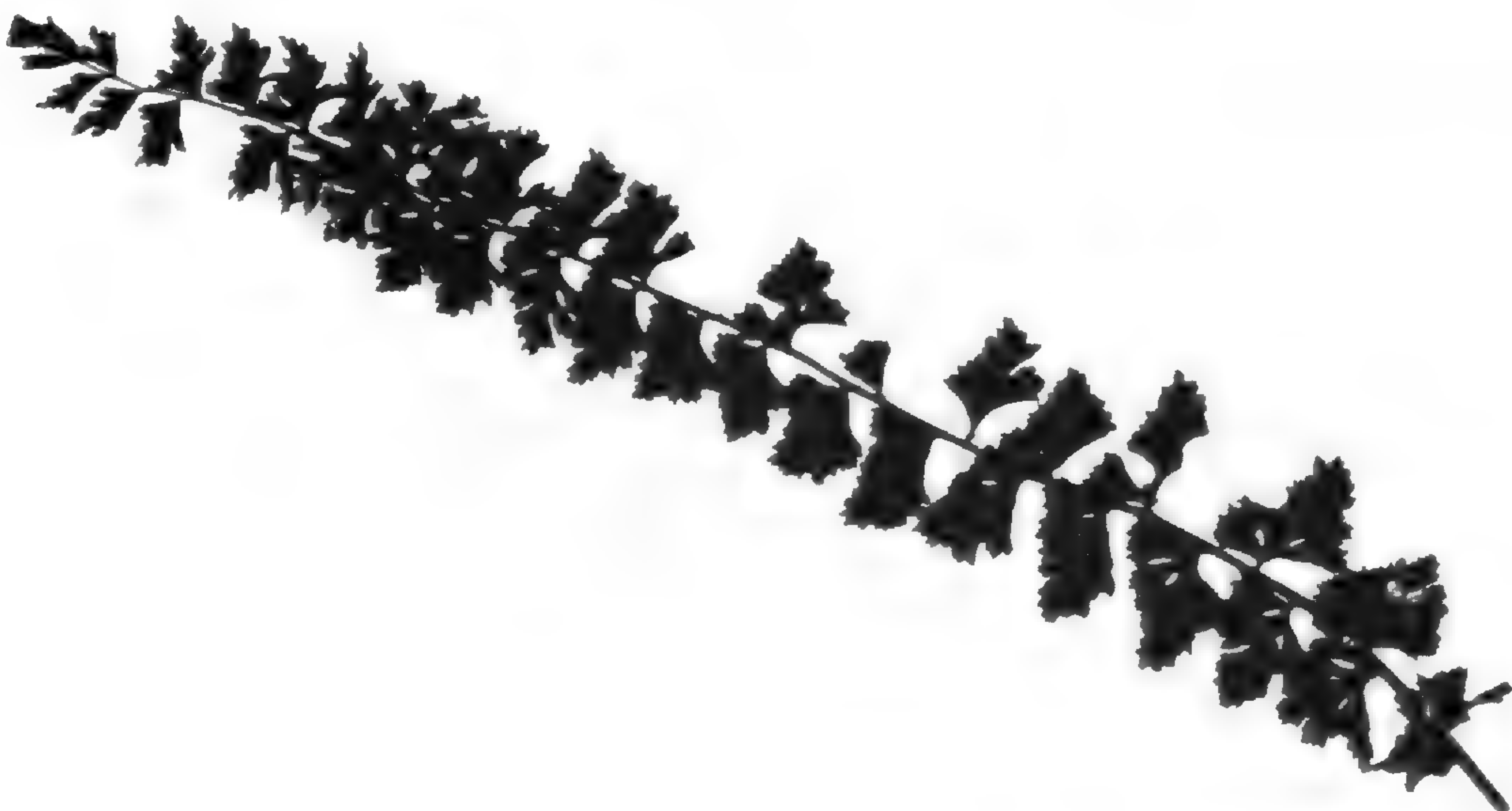


Fig. 1. *Asplenium trichomanes* "Incisum"

SPORES ON BEVIS

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Elsewhere in this edition of *Pteridologist*, Cor van de Moesdijk gives a comprehensive account of past sitings of sporangia on *Polystichum setiferum* "Plumosum Bevis" and provides full details of his own successes both in 1982/3 and 1993. Having had some success myself also in 1993 I have collected data and photographs, and fellow spore hunters may be interested in the method I adopted and the results obtained. The method itself may be applied to Bevis or, indeed, any other near-barren *P. setiferum* varieties.

Timing is very important, to ensure that the few precious spore capsules present have not already opened, but nevertheless are developed sufficiently to be visible to the naked eye. A close watch should therefore be kept on other *P. setiferum* close by to judge when the spore capsules are well developed without having quite turned black. Most of mine were discovered in the middle of June and harvested at the end of the same month.

As in the case of previous sitings, and as I was to find myself, one can be searching for anything from a single spore capsule to a full sorus of 20-30 capsules, with or without an indusium. A very methodical approach is therefore required, and one needs to have some garden canes, a hand lens, a very fine artists brush, and some short lengths of brightly coloured thread for marking pinnae.

The garden cane is used to mark the starting point around the plant, and from this point each frond is systematically examined, starting from the top, and using the hand lens to examine any suspected signs of fructification. Gentle use of the paint brush will help eliminate what frequently turn out to be tiny pieces of insect debris or bits from from overhanging trees. In addition to marking pinnae with a thread, I found so much sporulation activity after two full days of examination (sporangia being at varying stages of ripeness) that I needed then to number each marked pinna and record progress to ensure that each was collected at the best time - when an optimal number of spores capsules glistened under the hand lens like a small bunch of black grapes. I would also advise the provision of some protection from possible rain - an overhead canopy is better than bagging the fronds, the latter being far more hazardous to singleton spore capsules.

In all, 24 sporangia were found on my Bevis specimen plant. 14 of these were on separate fronds, and five further fronds had two on each. This plant is a large multi-crown clump of about 70 fronds, generally 40-46 inches long, growing in full shade, undisturbed for the last six years. No evidence of sporangia was found on any of four other Bevis plants elsewhere in the garden, all in less shady positions, or on any "Gracillimum" plants. However, five occurrences were seen on a Drueryi-type seedling raised by Cor van de Moesdijk, and ten on a plant of the lightly crested Bevis progeny now known as "Plumosum Ramo-pinnatum" referred to in Cor's article. In the latter case, three of these appeared on the same frond. "Plumosum Ramo-pinnatum" tended to yield a higher proportion of full-size sori.

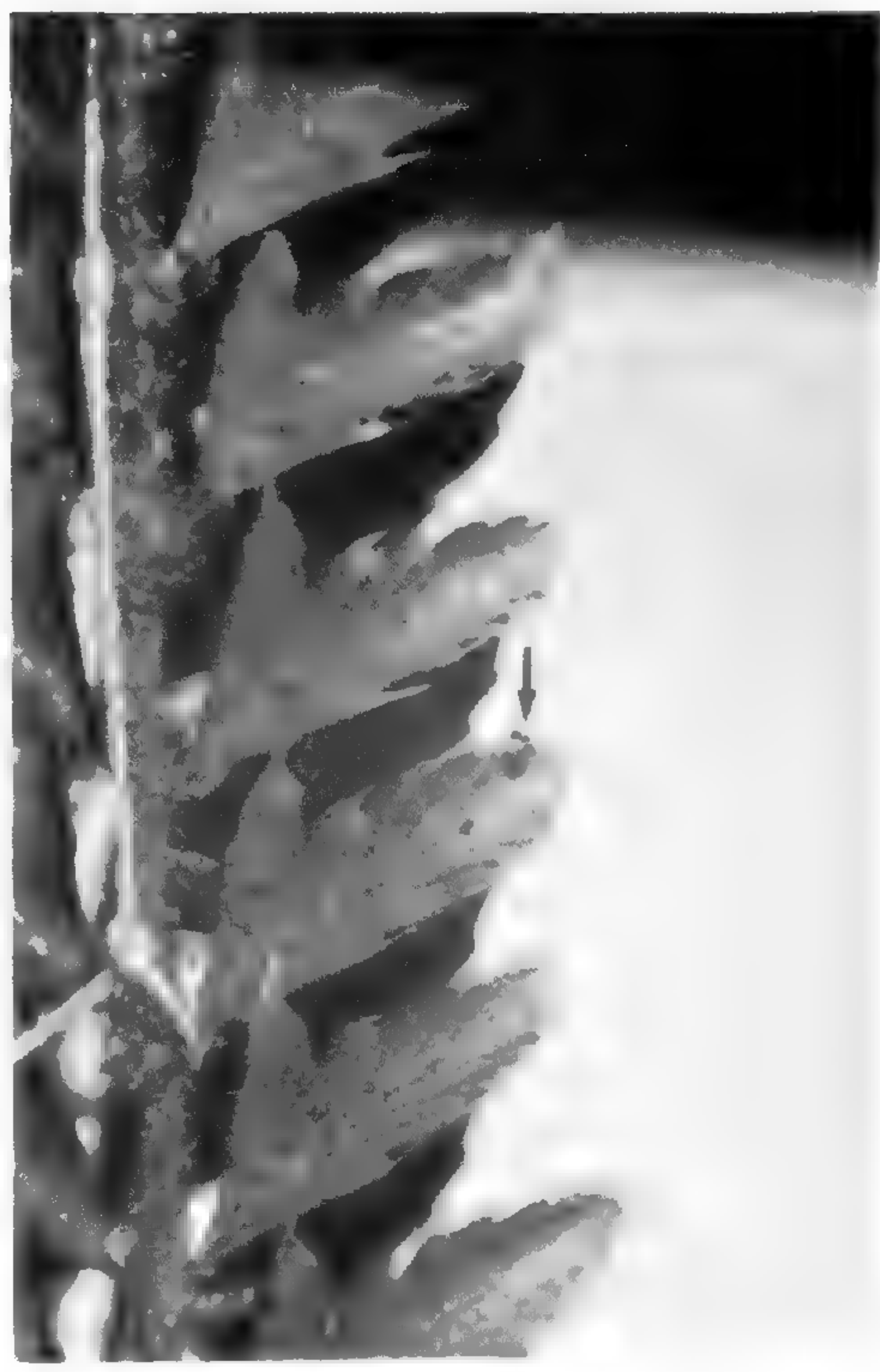
I have organised fructifications I found into the five categories below. Sorus size varied considerably.

- Type 1 (15%) A single spore capsule which never fully ripened
- Type 2 (13%) A single spore capsule which ripened to yield spores
- Type 3 (28%) A small cluster of 2-8 capsules yielding spores
- Type 4 (26%) A good sorus of between half and full size
- Type 5 (18%) As Type 4, but with indusium

Each type is illustrated in the photographs (Fig. 1.) which also show the common locations of the sporangia - notably, towards the edges of pinnae or, in two cases,



Types 1 & 2



Type 3



Type 4



Type 5

Fig. 1. Sporangia on *Polystichum setiferum* "Plumosum Bevis", 1993

actually on the edge. Fertile pinnae were almost always found on the upper half of the frond. As also observed by Cor van de Moesdijk, the appearance of the reverse of the frond usually signalled a higher probability that fructification would be found. This seems to be a combination of an increase in the tiny (almost hair-like) scales which cover the reverse surface of the pinnules, and more prominent venation - both of which I hope remain visible in the photos. In several instances some thickening of the pinnule in the immediate vicinity of singleton spore capsules was noticed, coupled with some localised chlorosis. In some extreme cases of Types 1 and 2 this thickening was sufficient to justify describing it as a "projection" which was terminated by the single spore capsule.

In sowing the spores collected I have three goals. Firstly, whilst Bevis progeny have been raised before, there is always the possibility of a completely new break, such as "Plumosum Ramo-pinnatum". Secondly, it is hoped that offspring from the latter may produce some more elaborate forms of variation. Finally, it is unusual to have the opportunity to hybridise Bevis with other *P. setiferum* and I have sown several mixed trays using "Foliosum", "Wakeleyanum", "Perserratum", "Congestum" and "Plumoso-divisilobum". I will report the results of all these sowings in a future edition of *Pteridologist*.

PROGENY OF POLYSTICHUM SETIFERUM "BEVIS"

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Polystichum setiferum "Plumosum Bevis" is a remarkable and beautiful fern, which has given rise to even better progeny. It is one of the ferns which has filled the former British Fern Gazette and also the former *Bulletin* with many publications and discussions on its origin, the species to which it belongs and its marvellous offspring^{1,5}. *Polystichum Setiferum* "Gracillimum" was in fact already pictured on the first page of the very first issue of the British Fern Gazette. Forty years after its discovery by John Bevis several members of the BPS succeeded in finding spores on *P. Setiferum* "Plumosum Bevis", amongst them Druery, Green, Stansfield, Edwards, Cranfield and Jimmy Dyce^{6,17,18,22}. I suspect that many more members of the BPS could have found spores on their plants if they had looked closely enough at the appropriate time, but it is also possible that they did not have ideal conditions for spores to develop.

As mentioned in the *Pteridologist*²² I succeeded in finding spores on my plant too (Fig. 1. *P. setiferum* "Bevis" - pinna which produced sporangia, fertile pinnule removed). Originally, I obtained a full grown division of this fern from Bob Trippit in 1981, who was so kind to take the risk of dividing his "Bevis". I took it in a (heavy) suitcase home by plane and planted it with great care in my garden in an good coarse peat with fertilizer and chalk added. (ca 7-8g chalk per litre of German peat, 2-3g soluble fertilizer per litre of peat) Several times in that year I fertilized the plant with small amounts of soluble fertilizer (1-2g per litre) and at the end of the summer of 1982 I was surprised by a few single sporangia, seen as tiny white spots at the backside of the frond. A closer look with a microscope revealed that indeed the sporangia contained



Fig. 1.

spores! More were found in the summer of 1983. It could be seen that the underside of the fronds felt a little bit rough due to small excrescences and single "one-eyed" sporangia could occasionally be found on top of some of these small excrescences apart from groups with a few spore cases²⁰, but never full sori with indusia. A maximum of two single sporangia could be found on one pinna. The majority of the pinnae did of course not have spore cases at all.

A close eye was kept on the sporangia ripening and after blackening they were collected. This was more difficult than finding the white spots and had to be done with the aid of a hand-lens, because the ripe sporangia could hardly be seen by the naked eye and it sometimes was even difficult to find them with the aid of a hand-lens. The spores were sown in different batches in the winter in my loft with light from a north facing window and a fluorescent lamp directly above it (color 83). I now grow them without any daylight!

After a couple of months the small prothalli were pricked out into a polystyrene container (15x15 inches) and a large number of tiny plants (probably more than thousand!) resulted after another couple of months. The plantlets already differed greatly in size and from those shown and described in detail by C.T. Druery²⁰. The plants were pricked out in a potting mixture and placed in a greenhouse at a nearby plant nursery because my pocket-size garden could not manage that large number of plants. However, one weekend in the following summer extremely heavy rainfall broke the glass just above the "Bevis" plantlets and they were all washed away. After the weekend half of the plants were saved out of the dirt and were potted again; maybe 400-500 survived. The plants grew vigorously and were planted in plastic pots in 1985. In the summer of that year we acquired quite a piece of land for building a house and my wife and I were very busy organising everything to get our new house built. The potted plants were placed at a friend's garden beneath a walnut tree. In the winter following we were surprised by the most severe frost in twenty years (two spells of about 14 days of -15°C down to even -24°C).

Although care was taken to protect the plants many were lost, among them many fine "Gracillimums" and possibly new breaks. The next winter also was severe and more plants were lost, because they were still standing outside in plastic containers. In 1986 the remaining (100-120) plants were planted out and they grew to maturity. I estimate that about 10% of the plants left are true "Gracillimums" and 40% plain *Polystichum setiferum* with its typical dull green colour and very fertile. This was also noticed by Druery²⁰. Most of the reversions to *P. setiferum* have ended their life on my compost heap. 50% are nearly true "Bevis", but most a little bit coarser than my original "Bevis" and completely sterile. No "Foliosum-Edwards" type of plant nor a "Plumosum Green" type of plant was seen. One plant has a tendency of splitting up some of the pinnae as can be seen in the picture made by Martin Rickard (Fig. 2. *P. setiferum* "Plumosum Ramo-pinnulatum" group, pinna). He considers this as a new break of "Bevis" and baptised this plant "Ramo-pinnatum".

"Gracillimums" show also some variation, some are a little bit finer than others. Good growing conditions do give some of the "Gracillimums" a "Cristulatum" appearance. Anyhow, the "Gracillimums" grow very slowly and are *miffy* as Jimmy Dyce mentioned in his publications on

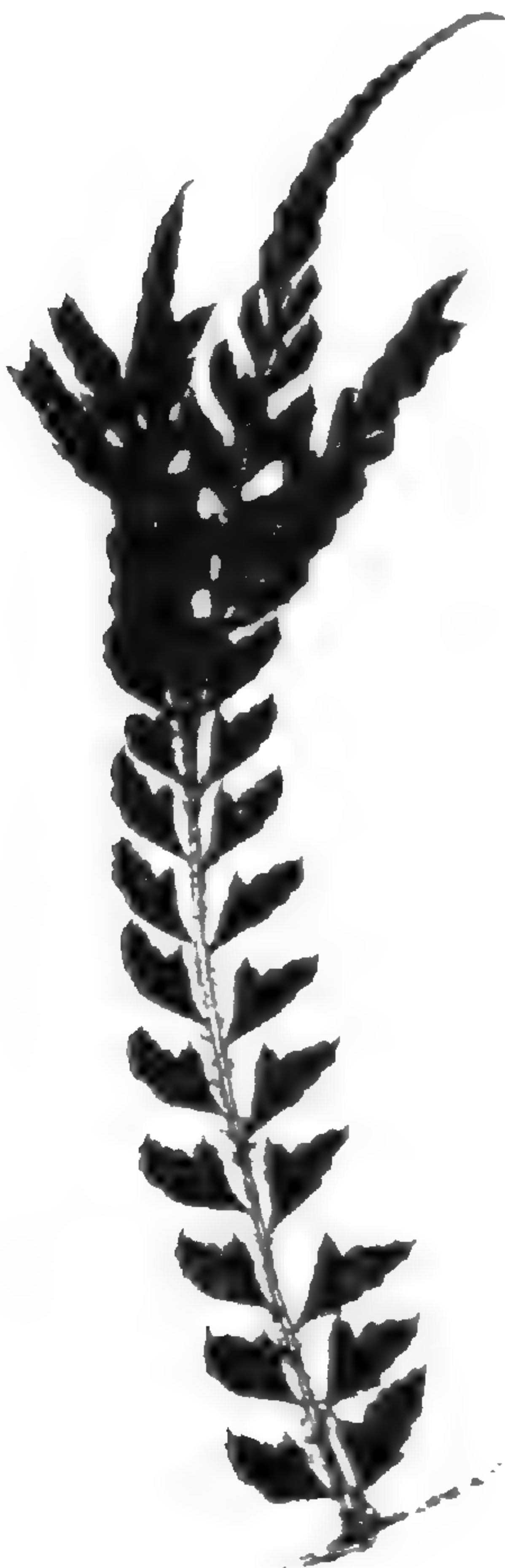


Fig. 2.

Bevis progeny. A small disorder and the plant fades away. I gave about 10-15 "Gracillimums" to friends and some 15 are still in my garden. The "Bevis" type is extremely vigorous, and at this moment I possess most probably the largest collection of "Bevis" progeny. People interested to exchange some of my plants ("Gracillimum" only very few!) could get one. The problem, however, is that most plants have sizes of 40 inches and more and are quite heavy!

Happily, after more than 10 years of sterility a very few sterile "Bevis" type of plants did give single sporangia again in 1993 on the same lines as described before. I noticed it in the spring when again I saw white spots on the backside of a few plants (progeny). Only one of the plants contained just one pinnule with the normal group of sporangia and indusia as if it was completely fertile! I marked the sorus-bearing pinnae with a ribbon, but later on I sometimes had trouble finding the sporangia again even with a lens! It was surprising that a strong growing plant was not always fertile. One of the plants was not very vigorous, but had most sporangia. Also in this case it was noticed that if the back side of the frond is a little bit rough and excrescences are seen, there is a chance that sporangia can be found. A smooth back side only rarely carries sporangia in my experience. What was different compared to the previous years? In the first place we had had an extremely mild winter. Secondly in the autumn of 1992 I gave all the ferns a large dressing of 3 year-old decayed manure; this was also practised in the old days and has been reported in the *Gazette*.

I collected the spores and sent about half of them to Martin Rickard. I hope he will have success with them too. Although I did not sow spores for more than five years I could not resist giving it another try this year. So, I kept the other half of the spores myself and I hope that new surprises will occur. The above discussed plant tentatively named by Martin Rickard as *P. Setiferum* "Plumosum Ramo-pinnatum" did contain two single sporangia and who knows they may result in a crested "Bevis" as Martin expects. At this moment prothalli are seen and look healthy.

So much for my successes and failures with *P. Setiferum* "Bevis" The cristulatum character in some "Gracillimums" and the starting of crested in "Bevis" raises another question: how does crested arise in ferns? This question has caused many discussions in the fern literature and has been raised by Jimmy Dyce for "GracillimumCristulatum". Is this "pseudo-tasseling" as described by Druery¹⁹ crested or not? Cresting seems to be more or less natural in ferns. Lowe proved that inheritance between forms and even hybridization could take place between species⁷. However, although many forms do appear to breed true, we see that progeny of many elaborate forms yield unexpected crested. Several plumose lady ferns have yielded crested forms²¹. The case given by Druery in his book is famous. But also *Athyrium filix-femina* "Frizelliae" has given tasseling forms. And I noticed several years ago that a sowing from *Asplenium scolopendrium* "Crispum", which was scarcely fertile and may be considered as a "Plumosum" produced all kinds of forms, among them some heavily crested ones. So once again, what is really inherited and what is caused by abnormalities in the chromosomes? Will it eventually turn out to be normal to get a crested "Bevis" type and even crested "Gracillimums" as long as we obtain spores from these plants for further generations? I expect that in the future we may get an answer to the question why spores are only scarcely produced on the excellent, apparently sterile garden forms. This is a still unexplored area, and I am convinced that somebody will find out before long! A survey of the publications of the BPS on *P. Setiferum* "Bevis" and its progeny is given below.

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- 4 J.W. Dyce, *Bulletin*, Vol.2 (1) 1979 p 38.
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- 8 E.A.Elliott *The British Fern Gazette* Vol.8 (7) 1956 p 159.
- 9 Editor *The British Fern Gazette* Vol.7 (5) 1938 p 124.
- 10 F.W. Stansfield *The British Fern Gazette* Vol.3 (30) 1916 p 123.
- 11 F.W. Stansfield *The British Fern Gazette* Vol.3 (31) 1917 p 154.
- 12 C.T.Druery *The British Fern Gazette* Vol.2 (20) 1915 p 200.
- 13 C.T. Druery *The British Fern Gazette* Vol.2 (24) 1915 p 283.
- 14 C.T.Druery *The British Fern Gazette* Vol.1 (1) 1909 p 1.
- 15 C.T. Druery *The British Fern Gazette* Vol.1 (2) 1909 p 24.
- 16 C.T. Druery *The British Fern Gazette* Vol.1 (3) 1910 p 50.
- 17 C.T. Druery *The British Fern Gazette* Vol.1 (5) 1910 p 119.
- 18 C.T. Druery *The British Fern Gazette* Vol.1 (6) 1910 p 133.
- 19 C.T. Druery *The British Fern Gazette* Vol.1 (10) 1911 p 226.
- 20 C.T. Druery *The British Fern Gazette* Vol.1 (11) 1912 p 271.
- 21 C.T. Druery *British Ferns and Varieties* 1910 p 30
- 22 J.W. Dyce *Pteridologist* 1,2 1985 p 79

Photographs of *P. setiferum* "Plumosum Gracillimum" can be found in lit.9,11,14,19,21
 A Photograph of *P. setiferum* "Plumosum Green" can be found in lit.16
 A Photograph of *P. setiferum* "Foliosum Edwards" can be found in lit.13.
 A Photograph of *P. setiferum* "Plumosum Drueryi" is depicted in lit.10

MORE FERNS IN THE SUN

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I read the article "Growing hardy ferns without shade" by A.R. Busby (*Pteridologist* 2, 4, 1993) with great interest, and can add further species and varieties that I am growing under similar, less than ideal conditions.

Firstly, a quick note about my garden, to make the problem clear. We moved to our present house, which is situated one and a half miles from Hastings sea front, in December 1991. The garden is approximately 70 by 30 feet, and originally consisted of a lawn and an empty vegetable plot. We are on the side of a valley running roughly south, south-east, with a fairly steep slope across the garden. Trees at the bottom of the garden which backs onto mine offer shade in the early morning.

The soil is heavy clay which bakes and cracks during the summer. I cannot confirm whether it ever completely dries out, as any attempt to dig holes when it is baked merely results in a bruised foot and jarred shoulder. To give some idea of the cracking capability of my soil I measured a crack at half an inch wide by eight inches deep. A crack of similar width ran through the middle of a small clump of *Blechnum penna-marina* with no long-term ill effects to the plant.

I have divided the garden into areas according the conditions during July:

1. Shady virtually all day, and so I will ignore the ferns here.
2. Shade until about midday, and then again from about 7pm, when the house shades the garden.
3. Most of the garden, which is receives full sun from about 9am until evening.

Area 2 has the following ferns (* = Planted out in spring, 1993): *Athyrium filix-femina* vars: Cristatum group, "Frizelliae", "Plumosum Axminster", & "Victoriae"; *A. geringianum* "Pictum"; (?)*Athyrium* sp. ACL/G from Yunnan*; *Blechnum spicant*, *Cystopteris diaphana*, *C. fragilis*, *Dryopteris affinis*, *D. affinis* "Cristata Augusta", *D. dilatata*, *D. filix-mas* "Depauperata" & "Linearis", *D. (?)lacera**, *D. wallichiana*, *Onoclea sensibilis*, *Polystichum setiferum* "Divisilobum" & (?)Plumoso-divisilobum" and, finally, *Pteris* sp. CLD1228. Rather to my surprise *Athyrium filix-femina* "Plumosum Axminster" has done extremely well, even though it is about the most exposed of the group. The two *Cystopteris* species are growing out of a low wall that holds back my pond, while *Onoclea sensibilis* and *Pteris* sp. CLD1228 are growing in a small bog bed (made from off-cuts of the pond lining) at the base of the retaining wall.

Area 3 contains the following: *Asplenium rhyzophyllum**, *A. scolopendrium* "Cristata", *Polypodium (?)australe**, *Polystichum munitum* and a *Polystichum* species from Yunnan*, all growing on top of the wall. A second small bog bed (more off-cuts) contains *Osmunda regalis*, *O. regalis* "Purpurascens" & *O. regalis* "Cristata". The rest of this area contains *Adiantum pedatum*, *A. venustum*, *Blechnum penna-marina*, *Dryopteris filix-mas* "Cristata Martindale" and *Polystichum setiferum* "Tripinnatum".

I am trying to improve the soil by mulching with compost, but each batch produced only covers a small area, and I have planted a few shrubs and other plants amongst the ferns, which will eventually provide some shade. To finish, I can but echo Matt Busby's advice to experiment if, like me, you get too much sun in your garden.

AMONG THOSE DARK SATANIC MILLS - Extracts from the records of the Halifax Scientific Society, founded 1874

MARGARET ROTHWELL, 42 Victoria Avenue, Elland, W. Yorks., HX7 8JX

When I was first invited to act as fern recorder for the Halifax Scientific Society, I did not expect that there would be a great deal to record, other than in botanically rich cloughs such as Hardcastle Crag, Luddenden Dean, Crimsworth Dean etc., which are a separate issue. After all, the grimmer aspects of Halifax are more reminiscent of a line from the poignant folk-song, *A Dalesman's Litany*: "From Hull and Halifax and Hell, good Lord deliver me" than of a pteridologist's paradise. However, I was soon to be pleasantly surprised and delighted to be proved wrong.

The old records themselves make fascinating reading, not least because of the association of Halifax with the notable James Bolton, and nearby Todmorden with the Stansfields of B.P.S. fame. Extracts from letters such as that from J. Nowell to R. Leyland (Sept. 11th, 1837), whilst interesting, sadly record local extinctions: "Agreeable to your request I send you a quantity of *Cryptogramma crispa* I have gathered at Scarth Rake, south-west Yorkshire".

It is remarkable that the Halifax flora has a 1666 record for *Diphasiastrum alpinum* at Mile Cross in Gibbet Lane, less than two miles from the city centre. Whilst it is "long gone" from this site it must be agreed that, "with so much moorland within the parish, it is improbable that they [the clubmosses] have become extinct".

Today it is still possible to find interesting plants in the urban environment. Mill walls play host to *Asplenium scolopendrium* (a species once recorded as nearly exterminated in the area), *A. trichomanes*, *A. ruta-muraria* and *Polypodium interjectum*, as do basements such as that of Brookfoot Motors, Elland - the high humidity creating gryke-like conditions. A remarkable wall at Hunger Hill, Halifax is practically covered with *A. ruta-muraria* - a plant which Bolton recorded "in plenty" on the walls at Sowerby Bridge in 1775.

Cemeteries also seem, paradoxically, to be full of life. Stoney Royd cemetery, Siddal has about a dozen plants of *A. scolopendrium*, whilst a local crematorium surrounded by woodland shelters the last remaining plant of *Polystichum setiferum* in the area. This species was "once productive of many nurseryman's varieties named by Thomas Stansfield in Miall's Flora".

Railways and cuttings present more choice species: *Osmunda regalis* is recorded on rocks in a cutting in the Ryburn Valley and a plant of *Asplenium adiantum-nigrum* was recently found at North Bridge, Halifax as well as a member of the *Dryopteris affinis* aggregate, confirmed as "morphotype *borreri*, but near *robusta*" by Clive Jermy.

Canals and riversides constitute urban oases for ferns. Besides the usual *Athyrium filix-femina*, *Dryopteris filix-mas*, *D. dilatata*, and *D. affinis borreri*, a wall overlooking the canal at Elland has a single plant of *Asplenium ceterach* (unrecorded prior to 1986) and *O. regalis* grows on the canal side at Mytholmroyd, on the banks of the river Ryburn above Ripponden and "on rocks at the side of filled-in canal near Phoebe Lane, Halifax were formerly several large plants, now nearly gone". (1987)

If pollution is ever sufficiently controlled for me to witness the rediscovery of *Hymenophyllum wilsonii*, first recorded at Turner Clough in 1834 by Leyland and "authenticated by specimens" close to mills, but in a locality which is "by no means deteriorated", I shall be even more convinced that "deliverance" from the parish of Halifax is by no means necessary, and that I need travel no further than these "dark satanic mills¹" to find my pteridologist's paradise.

MARGARET ROTHWELL

CONSERVATION AND THE SPORE LIST

MARGARET NIMMO-SMITH, 210 Chesterton Road, Cambridge, CB4 1AH

After managing the BPS Spore Exchange for the past six years I have come increasingly to realise its potential as a resource for conservation, often under-used at present. There are many different aspects to this. Primarily the exchange is used by horticulturalists, both in this country and abroad, who wish to extend the range of ferns they grow. Through the lead of the National Council for Conservation of Plants and Gardens (NCCPG), the rôle of the amateur is now seen as making an important contribution to the conservation of the wealth and diversity of plants grown in our gardens. They are the guardians of our horticultural plant heritage. The BPS spore list has been used by national collection holders to help build up their fern reference collections. The BPS exchanges spores regularly with botanical gardens and at present I am processing a large request to help the ancient botanic garden of Leiden which has an excellent tropical fern collection, to build a collection of hardy ferns.

In recent years there has been an upsurge of interest in growing foreign hardy ferns and the spore list has given fern growers the opportunity to raise sufficient ferns to experiment with their hardiness out of doors. In this area the work done by Richard Rush (and published in his book) has been an invaluable inspiration and aid. Several smaller nurseries in Britain are now offering a range of hardy ferns for sale to a general gardening public, now becoming increasingly aware of their value as garden plants. Often these ferns have originated in the spore exchange.

The Spore Exchange list also offers the opportunity to try material collected in the wild, sometimes from areas which may offer hardy or nearly hardy ferns. Recently I received a consignment collected in New Guinea from an area where the botany is poorly known,

¹ with apologies to William Blake who was probably referring to the repressive churches rather than the familiar relics of the once thriving textile industry to which I refer.

and the ferns are not yet identified. It is hoped that more plant hunters will use the Spore Exchange as a means of distributing their spore finds. Members are often shy of trying new or unknown taxa, missing the opportunity to extend the number of ferns in cultivation. Each year I find there are many ferns on the list which are under requested. To encourage members a survey form was circulated last year to find out about members' fern-growing interests. To date about 30 replies have been received. It is hoped through this to give surplus spores to interested members to try. In future I would like to attempt to list the relative hardinesses of taxa on the spore list so that members will feel encouraged to try new items.

The cultivars on the list are as important as the species. Many, such as *Dryopteris affinis* varieties come almost 100% true from spores. Others offer immense opportunities for fern breeding and the possibility of reproducing lost varieties, such as has recently happened with *Athyrium filix-femina* "Kalothrix". Care should be taken with the naming of fern cultivars raised from spore to make sure that only those true to type are given the name. If there is much variation a group name can be used. When raising plants in quantity poor specimens should always be junked.

Finally, there is a more academic area in which the BPS can assist. I am asked occasionally to produce material for students' research projects, and also to assist in conservation projects. However, there are certain rare British fern species such as *Woodsia alpina*, *Athyrium flexile* and *Cystopteris montana* which have been conspicuous by their absence from the list. I would make a plea for anyone growing these species to donate spores so that they can become more firmly established in cultivation and more readily available for research.

I have enjoyed my work for the Spore Exchange tremendously, but it is only possible thanks to the hard work and dedication of the many donors around the world.

44th AIBS ANNUAL MEETING - Iowa State University 1-5th August 1993

CATHERINE ANN RAINE, Department of Cell and Structural Biology, Williamson Building, Manchester University, Oxford Road, Manchester, M13 9PL.

Thanks to the BPS Centenary Fund I was able to attend the 44th AIBS Annual meeting in Iowa as a final year SERC funded postgraduate student from Manchester University. This proved to be a very valuable opportunity to meet other workers in my field. With this financial help I was also able to go on the associated pteridological field trips before the meeting.

Despite the torrential rains and floods, prior to this conference (requiring a change of venue and accommodation) it was by no means a wash out. There was even some good weather and sunshine for the field work. The first three day trip to the Palaeozoic Plateau region of northeastern Iowa proved that this state isn't quite flat all over and that there are plants other than corn! The crops had suffered from flood damage but the ferns we saw were flourishing. Of particular interest was the tallgrass prairie site supporting *Ophioglossum pusillum* and another site with the prairie scouring rushes *Equisetum laevigatum* and *E. x ferrissii*. Personal highlights of the trip were seeing a putative *Gymnocarpium* hybrid persisting on talus slopes kept cold by air flow from ice caves, the abundant maidenhair *Adiantum pedatum*, finding the gemmiferous *Huperzia lucidula* and visiting a 10 acre *Equisetum x litorale* marsh.

The following one day excursion took us to the infamous Woodman Hollow State Preserve in Central Iowa where we saw most of the 14 recorded pteridophytes including *Dryopteris goldiana*, *Cryptogramma stelleri*, *Woodsia obtusa* and *Matteuccia struthiopteris*. This was a fascinating place to visit but, if the stinging nettles didn't get you, the mosquitoes did! They are deterred by no amount of clothing!

The conference ran from 1st to 5th of August. The American Fern Society (AFS) held their meeting on the first day with topics including molecular techniques, palaeopteridology, population dynamics, antheridiogen responses, structure of spermatozoids and gametophytic gemmae. The Killarney Fern (*Trichomanes speciosum*) was well represented in this section by our little team. Dr Junxia Ji started the day with her presentation on DNA amplification and its application to a genetic study of the Killarney fern. In the afternoon, Fred Rumsey enlightened us with electrophoretic analysis of this mysterious fern. My own presentation concentrated on growth rates of gametophyte gemmae under different environmental conditions and the possible controls of gemma production.

The AFS meeting was celebrated in true style at luncheon with an amazing cake in the form of a mature cordate gametophyte bearing fully functional gametangia! (Fig. 1.) It was very tastefully presented, but I wasn't quite so drawn to the green icing when it was served up!

The following day the select pteridological poster session played host to my two contributions, one on evidence for sexual reproduction in *Trichomanes speciosum* and the other on differences between gametophyte gemmae in the whole family of filmy ferns. One other poster from Edinburgh completed the session with a look at the rôle of soil spore banks in fern conservation.

Several other contributions in the remainder of the conference were of interest to the pteridologists including the ecological section of the phytogeography and ecology of rock cliffs, barrens and glades in North America. Don Farrar and Jeffrey Walck highlighted the environment in which North America's independent gametophytes are typically found, and the fact that few have studied this habitat in depth.

It was extremely helpful to speak with workers whose research paralleled my own and to have their guidance when observing new fern species on the field trips. Without the help I received from the BPS this would not have been possible. Thankyou.



Fig. 1. Gametophyte cake which was served at the AFS luncheon during the 44th AIBS meeting in Iowa.

SHORTER NOTE

Adiantum balfourii

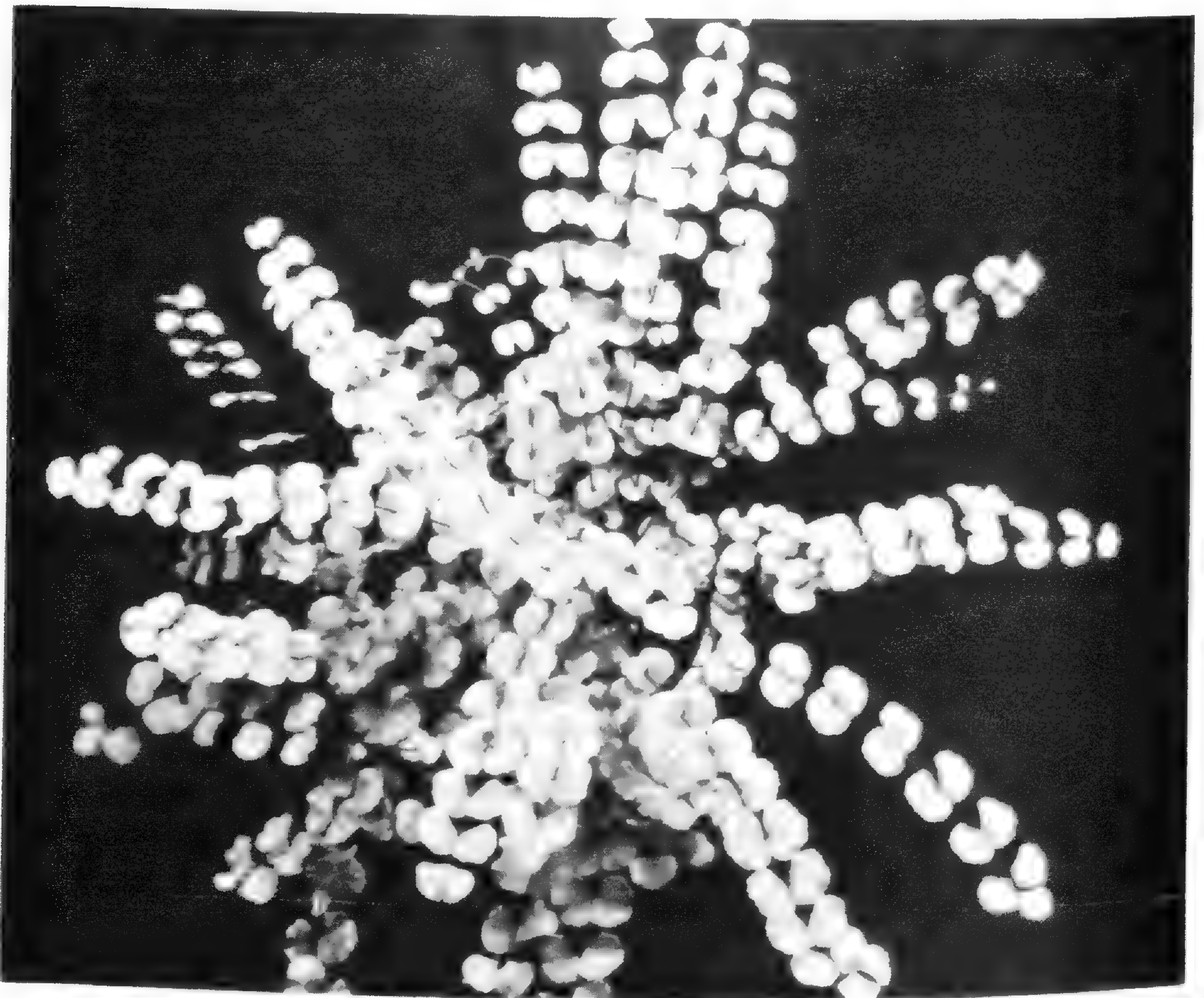
Whilst looking through some old copies of the Journal of the Royal Horticultural Society that my mother had given me I came across a short note about what appeared to me to be a rather unadiantum-like *Adiantum*. I have been unable to find any mention of *Adiantum balfourii* and would be very interested in any information that other members may have on this species¹.

AWARD PLANTS 1972/1973

Adiantum balfourii A.M. September 26, 1972, as an ornamental foliage plant for the temperate greenhouse. An attractive pot plant about 10 inches in height, the chestnut almost black shiny stems are wiry and contrast with the dainty appearance of the light green leaves. The pinnae are in opposite pairs, almost sessile, orbicular and equally sided up to $\frac{3}{4}$ inch long and $\frac{1}{2}$ inch wide. The sori are marginal, linear in shape and not continuous. This species is native to the mountains of the island of Socotra², having been discovered during the exploration of the island by Professor Isaac Balfour and Dr Schweinfurth before 1883. Specimen in Herb. Hort. Wisley. Exhibited by The Director, The Royal Botanic Garden, Kew, Richmond, Surrey.

(first published in the Journal of the Royal Horticultural Society vol. XCVIII October 1973 Part 10)

MARK BORDER



Adiantum balfourii

¹ This seems to me to be an ideal subject for the BPS *I'd like to know* service, given a plug by the President in this issue - ed.

² Yemen, off the "horn" of Africa.

BOOK REVIEWS

THE FERN GUIDE. A FIELD GUIDE TO THE FERNS, CLUBMOSESSES, QUILLWORTS AND HORSETAILS OF THE BRITISH ISLES by James Merryweather and Michael Hill. Reprinted from *Field Studies* (1992), 8: 101-188. Price £6. ISBN 1 85153 211 0

Despite the publication in 1991 of the Jermy and Camus *Illustrated field guide to the ferns and allied plants of the British Isles*, there is still a place for this AIGAP beginners' guide with its very different and sympathetic approach. With good integral illustrations, minimal use of technical terms (without being patronising) and the use of only a hand lens, the guide enables all British pteridophyte species, to be identified in the field. Pointers are also given to the recognition of three common hybrids and seven aliens.

A number of features make for the beginner-friendliness of this guide. Species with wide morphological variation key out in more than one place; tables replace the dichotomous key format when a suite of characters is better suited for the separation of the more critical species; and I particularly enjoyed the 'Don't Panic' comments where the beginner is likely to encounter difficulties. There are helpful tips for confirming the identification of species and on how to recognise possibly confusing non-pteridophytes. There is a good index.

The drawings by Michael Hill are generally good with plants, leaves and other selected details readily recognisable. However, one must quibble with the choice, on page 156, of three complete leaves to illustrate pinna shape - and there are probably better examples. On page 184 the uniquely broadly triangular basal pinnae of *Gymnocarpium dryopteris* are insufficiently distinctive.

At the back of the book are 29 excellent, small, colour prints, the last four having been chosen to show the condition required of sporangia for spore collecting.

My enthusiasm for the guide is tempered, unfortunately, by far too many typographical errors (some referring the user to the wrong page). Also there is confusing labelling of some of the drawings; inconsistency in the style of the statements used at each dichotomy; a number of cases of poor punctuation which, on several occasions results in, albeit sometimes amusing, ambiguity; and there are too many questionable points in the glossary. However, although aggravating, possibly confusing, these do not substantially alter the effectiveness of the key, except on page 162 where the directions to the next stage of the key have been transposed in the second and fourth boxes.

I understand, and it is a pity, that the author and illustrator were not given the opportunity to correct the final proofs, when errors etc. could have been dealt with.

Some might query the size of the volume for a field manual, although it is consistent with other AIDGAP keys which are not all field guides. However, this is a minor criticism - it does have a water-repellant cover!

The Field Studies Council should be urged to publish a corrected, second edition as soon as possible. If available at the same price it will be excellent value for money and to be highly recommended for the new beginner.

JENNIFER IDE

FLORA EUROPAEA Vol. 1 Psilotaceae to Platanaceae, second edition.
 Edited by G. Tutin et al, Cambridge 1993. Pp. xlvii, 581, 5 maps.

It is twenty nine years since the first edition of this standard work was published and, not surprisingly, there have been sufficient changes in the European pteridophyte flora to more than justify a new edition now. Some are straightforward new records eg. *Psilotum nudum*, whilst others are new species emerging from a complex eg. *Cheilanthes fragrans*

has been split into two species *C. acrostica* and *C. maderensis*. There are in addition perhaps 10 new subspecies.

Name changes are frequent and the rank of many species has also changed eg. subspecies to species and *vice versa*. There have been some name changes at family level, notably *Sinopteridaceae*, *Gymnogrammaceae* and *Cryptogrammaceae* have all been sunk into *Adiantaceae*, *Athyriaceae* has become *Woodsiaceae* and *Aspidiaceae* has become *Dryopteridaceae*. In addition the work has been rendered more valuable by the inclusion of full synonymy with each taxon.

A tremendous amount of research is encapsulated here, but clearly some problems remain, eg. in *Diphasiastrum*, which subspecies are hybrids? Occasionally new advances have been made since going to press, eg. *Dryopteris ardenchensis* is not included, but otherwise I think the whole treatment is up to date. As in the first edition, a few naturalised genera are listed.

Occasionally hybrids are included, eg. a few in *Polystichum* and *Asplenium alternifolium*, but no others, even in the promiscuous genera of *Asplenium* and *Dryopteris*. Such omissions are understandable, given the huge amount of extra work and text which would be required, but their absence is disappointing.

This is a very scholarly work, an essential reference for anyone studying the region's fern flora, and it is no longer sufficient to rely on the first edition. This new work will certainly be of great value to amateur and professional botanists alike, and it will be my key reference for the foreseeable future.

MARTIN H RICKARD

FERNS - THE BEAUTY OF THE NEPALESE FLORA by Vidja L Gurung, Sahayogi Press, Kathmandu. Pp. 236. Over 100 photographs in black and white, with 5 in colour on the cover. 1991.

Few books on ferns break new ground, but here we have a volume which I believe will become a classic of its time. 93 Nepalese fern species are illustrated, diagrammatically and by photographs, with a map of their distribution in Nepal, together with notes on their wider distribution. So far, it sounds a fairly predictable flora, but the difference between this book and so many others from around the world is that this is written for gardeners. Dr Gurung writes from personal experience and gives direction on soil preferences, suitability for hanging baskets, borders, bottle gardens, window sills etc. Altitude range in Nepal is given, with estimates of hardiness for each species. This book is not printed on glossy art paper, nor are all the photographs of the highest quality, but it is a good honest readable book which I strongly recommend.

MARTIN H RICKARD

SCANDINAVIAN FERNS by Benjamin Øllgård and Kirsten Tind, Rhodos, Copenhagen, 1993. Pp. 317, 103 line drawings in text and 114 col. plates. Folio (25 x 34cm). ISBN 87 7245 530 6 paper bound about £37, ISBN 87 7245 532 2 hard bound about £43.

If, like me, you think Scandinavia is too cold to have an interesting fern flora you are in for a pleasant surprise. 72 species of fern and fern ally are known, very similar to the tally from the British Isles.

Species not known in Britain include *Lycopodium complanatum*, *L. tristachyon*, *Equisetum scirpoides*, 6 species of *Botrychium*, *Asplenium adulterinum*, *Matteuchia struthiopteris*, *Diplazium sibiricum*, *Gymnocarpium jessoense*, *Cystopteris alpina*, *C.*

sudetica, *Woodsia glabella*, *Polystichum braunii* and *Dryopteris fragrans*. Not a bad list, when's the next boat?

This wonderful book is the first to be dedicated to the Scandinavian fern flora. I do not usually like books illustrated by paintings, preferring photographs or nature prints, but here each plate is executed with great accuracy and style. Every species is always illustrated several times, showing habit, including typically associated species, close detail of leaves, rhizome, sporangia etc. One day I can imagine this book being cut up by dealers with the plates being sold as prime examples of late twentieth century fern illustration.

The text is also excellent, including most of the generally expected details given in a very readable style with complementary black and white sketches of key features. My only criticism is the absence of distribution maps. A list of maps published in other, often rare, books is frustrating. There are full keys to species.

The price is high, but I can strongly recommend this book in the belief that no member would be disappointed with their £37 worth. Oh, yes, the best news last - you probably guessed - it is written in English.

MARTIN H RICKARD

ON GERMAN-ENGLISH RELATIONS AND THEIR CONSEQUENCES

or How to discover *Trichomanes speciosum* gametophytes.

JOHANNES VOGEL, Peterhouse, Cambridge, CB2 1RD

Often most important scientific discoveries have a simple story behind them. A good and most recent example is the invention of the Polymerase Chain Reaction (PCR) (honoured with a Nobel Prize in 1993). During a drive home on a lonesome mountain road one dark Friday night - the moon was shining - the Laureate Kary B. Mullis had a blitz of an idea or a short and sudden inspiration which earned him a few hundred thousand dollars a few years later and, as a by-product, revolutionized molecular biology.

But there are also far less important discoveries which have a long story behind them, and one of these is now to be told. Once upon a time, or more exactly in 1839, Queen Victoria decided to marry a German, Prince Albert zu Sachsen-Coburg-Gotha. This decision had several severe effects:

- a) the haemophilia gene was widely spread through the European Aristocracy (the last carrier of this Royal gene died in 1993)
- b) the Christmas tree was introduced into Britain (unfortunately, botanists by then had not agreed on a code and rules on the introduction of foreign species, and customs might have been sloppy)
- c) and last but not least, Albert promoted science and due to his efforts the British Museum (Natural History) - now The Natural History Museum - in London was built in 1881.

After this, no important or relevant relations can be recorded for the next 111 years until the author received a grant from the German National Scholarship Foundation to study Genetics for a year at Peterhouse in Cambridge, England. Here, working on seed proteins in beans, not surprisingly I developed an interest in ferns, or more precisely some biosystematic aspects of the genus *Asplenium*, and in summer 1990 I was introduced to an English Pteridologist, Dr Mary Gibby from The Natural History Museum. Until then I did not even know that such people existed. All I knew about ferns was that I had acquired a copy of the volume on Pteridophytes of Hegi's *Flora von Mitteleuropa* quite a while ago.

Unfortunately I had to go back to Germany as the grant only covered my expenses (mainly fees) for one year. In Summer 1991 a scholarship from the Natural History Museum was available to the Department of Botany and when Mary asked me if I was still interested in doing a PhD on *Asplenium* and, if so, would I like to apply for the grant, I needed little prompting to go for this unique opportunity.

I started in January 1992 and in July that year I had the opportunity to join Clive Jermy and others on a trip to Scotland to investigate a local industry (i.e. the Glenfiddich distillery) and perhaps, if there was enough time, to go out in the field and hunt for *Asplenium* on serpentine or visit the coastal sandstones. Here, Clive regularly disappeared into dark caves. I became suspicious, interested and inquisitive. Finally he told me, that this tiny, green and furry thing he was extracting from these not very hospitable places was a very exciting object, a fern. As he is *the* pteridologist, I had to believe him. Since I have been a keen botanist on the Continent we were able to discuss the possibility of finding this green stuff in the heartland of Europe and within no time suitable sites were selected. *Trichomanes speciosum* gametophytes are most likely to grow near sites where another of the Hymenophyllaceae, *Hymenophyllum tunbrigense*, has been recorded, eg. Luxembourg, Vosges and the Elbsandsteingebirge. Clive, joined by Ronnie Viane and the Rasbachs conquered the Continent first, but only reaching out as far as Luxembourg (just next to the sea) and they were successful.

I learnt all about serpentine ferns in the territory of the former GDR in Autumn 1992. Stefan Jeßen from Chemnitz (a fern expert not only for the territory of the former German Democratic Republic, GDR) told me about his search for the lost *Hymenophyllum* in the Elbsandsteingebirge, but it had to wait until July 1993 before we could set off together for the hunt. Starting at an ungodly hour in Chemnitz we reached the Elbsandsteingebirge by 8.00 a.m. I had described sites for gametophytes in the U.K. and Stefan had a superb knowledge of the numerous gorges and of the old sites of *Hymenophyllum* in the sandstone massif, which covers an area of around 300km². Starting at the western end of the massif, most spectacular gorges with steep rocks rising up to over a 100m were searched in good spirit. We were determined to succeed. The sandstone offered a lot of suitable microsites but the search pattern, learnt and applied successfully in Britain did produced neither gametophytes nor a sign of *Hymenophyllum*. After lunch, streams with permanent running water, a rare element in this area, were requested and we turned further east near the Czech border. Another valley, another failure and it was getting late, but a last valley had to be searched. "There is a vague old record of *Hymenophyllum* - in a valley near Hrensko" Stefan said "and I believe I know which valley it is". We stopped 3km behind the Czech-German border and the valley was most suitable, big boulders in a stream, deciduous woodland, mainly maple and beech and all quite lush and green. We started searching along the stream, climbing over boulders and searching under them and I was telling Stefan that these would be suitable sites in the U.K. We went further up the stream at an extremely slow pace searching every suitable hole but it was getting later and later - we had to go back to Chemnitz that day. I was still believing that the gametophytes could be found in the Elbsandsteingebirge, but I was rather doubtful that it would be today, as this most promising site was not about to reveal its secrets. Pondering along a foot path further upstream, leaving Stefan behind as he was hunting mainly for suitable *Hymenophyllum* sites (but he having the essential torch), I spotted a rock with crevices in a gorge and decided: "If not there, then nowhere in this valley". I got very nervous, shouted to Stefan to try to get hold of the torch and jumped over the stream. A crevice was most temptingly staring at me and within seconds I met "eye to eye" with gametophytes of *Trichomanes speciosum*, nicely displaying themselves in a most unusually open site - no torch required. 30 clumps of gametophyte, the biggest being 1cm², had been found after more than 7 hours of intensive search in an area of more than of 300km².



A suitable habitat for a fern? This enormous crevice (Michael for scale) contains at the very end - about 8m into the rock - a few tiny colonies of *Trichomanes speciosum* gametophytes.

Stefan Jeßen with his field assistants Michael Grundman (right) and the author (left).



We had been the optimal team, Stefan had all the local knowledge and I knew what these gametophytes looked like. The rest of the story is written up in the last issue of *The Fern Gazette*, but it has to be added that even though Stefan was able to discover the gametophytes at several more sites in the area, so far only one site is suitable for an appropriate photographic documentation of the gametophytes, the very first site in that valley.

Summary:

In 1840, seven years before *Hymenophyllum tunbrigense* was discovered for the first time in the Elbsandsteingebirge (Saxony), a German (Saxon) Prince was married an English Queen. He promoted science in England and subsequently The Natural History Museum was built. A few years later a studentship was offered by just this English Institution to a German student (albeit not a Saxon, but according to some ladies, of princely stature) who most gratefully accepted. He was trained by most knowledgeable and experienced English staff how to recognize a gametophyte of a particularly rare fern, which has its type locality in England (gametophyte, that is). He took that knowledge back to Germany and in close collaboration with a fellow German (Saxon), Stefan Jeßen, a new genus and a new species were added to the Saxon and Czech floras.

German-English relations and their consequences as a success story? Sometimes.

FERNS IN NEW ZEALAND

ROGER GROUNDS, *Apple Court, Hordle Lane, Lymington, Hants., SO41 0HU*

When Diana and I were invited to go to New Zealand as guest lecturers at the Trust Bank Garden World at Hamilton Gardens in North Island, I must confess my first thought was that I would at last get a chance to see all those fabulous antipodean ferns. In the event we had so much to do right up until the moment we left that I quite forgot about the ferns. But when we stepped out of Auckland Airport the very first thing my eyes lighted on was a clump of tree ferns and Phormiums in an island bed right in the middle of the car park. From then on, and for the next three weeks, I saw ferns wherever I looked, and an amazing experience it was.

The tree ferns growing in the airport car park were *Cyathea* species, mostly *C. medullaris*. Unlike the squat *Dicksonia antartica* that one occasionally sees in the UK, these *Cyatheas* have tall, slender and very elegant stems, sometimes as much as 20m tall. With finely divided fronds and much as 5m long, swaying gently in the breeze they seemed so desirable that one was almost tempted to move out to New Zealand, just to have them in one's garden. Over the next three weeks we were to see so many that they came to seem as mundane as bracken. Looking back on it the really surprising thing is that these tree ferns, and several others were growing right out in the open, in full sun and exposed to every wind that blew, on hillsides and car parks and in the middle of fields.

We were the guests of Ian Gear, the head of horticulture at Waikato Polytechnic at Hamilton and his wife Helen, and as Ian drove us from Auckland to Hamilton the roadside was thick with a large red-leafed fern. It was just everywhere. I asked what it was. Ian said it was just a *Blechnum*, adding that it grew everywhere. Certainly it was the commonest fern we saw in New Zealand, and as far as I can make out it does not have a name. It was the New Zealand version of *B. capense*, but even Brownsey and Smith-Dodsworth refer to it simply as *Blechnum* sp 2. Like the *Cyatheas* it was growing in full sun, which enhanced its colouring. We found a similar fern growing in our host's garden, but the fronds were much greener and the segments were quite undulate:

according to Brownsey and Smith-Dodsworth this is another nameless fern, *Blechnum* species 1. Nearby were a *Hypolepis* sp. and a good stand of New Zealand bracken, *Pteridium esculentum*, much stiffer and more finely divided than our native bracken. The next day we set off from Hamilton along the road to Kawhia Harbour and the beach beyond, famous for its black sands beneath which hot springs bubble. The purpose of our journey was to visit Lloyd and Christine Phillips, who are members of the British Hosta and Hemerocallis Society. The road took us over a mountain ridge, and at times we seemed to be driving along a knife-edge of a road, with dense forest disappearing down precipitous slopes to left and right. One got odd glimpses of desirable ferns among trees and indeed growing on the trees, but at the one or two places we found where one could pull off the road and get out of the car, the forest and its undergrowth were so dense that one could not get into it: it was impenetrable. However, the moment we turned off the road onto the Phillips' farm we found ourselves driving down an avenue of tall, wide-spreading trees whose trunks and branches were entirely covered with *Pyrrosia eleagnifolia* (*P. serpens*), whose almost succulent, felted leaves varied in size from round and no longer than the nail of one's little finger to almost the size and shape of one's thumb. There were several other first rate ferns in the garden, as well as the most sumptuous clumps of hostas we have ever seen, but what made my day, and indeed my trip, was when Lloyd took us across the road to see his stream. Lloyd is a cattle farmer, and about three years before our visit he had bought some 300 acres more land across the road. Not needing to put cattle on this land for the present he had fenced it off to keep the cattle out, and in just those three years it had become almost impenetrable jungle. The first thing we came to was a stand of *Cyathea medullaris* around the rim of a dell at the bottom of which was a cattle pond, the trunks of the *Cyatheas* draped with yet more *Pyrrosia*.

Then we plunged down into the woodland that had grown up. Many of the trees were already 8 or 10m tall, but the tree ferns were even taller and were the most conspicuous element in the landscape. The trunks of the trees, and indeed of the tree ferns, were thick with other ferns, and with the bizarre clumps of *Astelia* species. The first fern I stumbled on, right at eye level on the trunk of a tree, was the tiny, almost transparent *Trichomanes reniforme*, whose pale green, almost round leaves are no bigger than the nail of my index finger, the whole plant only an inch or two across. Nearby were *Phymatosorus* (*Microsorium*) *diversifolius*, but far more luxuriant than the poor weedy specimen we have growing in the moss that covers the bricks on the north side of a shed in our nursery. Nearby, and indeed sometimes actually growing together on the same tree and in the same place, was *P. scandens*, a fern which I had been trying to obtain for years, partly because there is a suspicion that it might be almost hardy. It has far narrower and more refined fronds than *P. diversifolius*. Two spleenworts were also abundant in this part of the wood, *Asplenium flaccidum* (Fig. 1.), the hanging spleenwort, which clings to the trunks of trees or the sides of large rocks, its roots buried in mosses and filmy ferns, its finely divided, rather leathery fronds hanging downwards for a length of a foot or more, and the shining spleenwort, or at least one of several spleenworts to which that epithet might apply. The one we saw was probably *Asplenium oblongifolium* (*A. lucidum*), but *A. obtusatum* is similar in having very very shiny, dark green fronds.

Farther down in the woodland, nearer the river, the ground was much wetter, and the ferns were different. Here the *Blechnums* came into their own. *B. fluviatile* was abundant, conspicuous on account of its fertile fronds, but there were also great clumps of *B. colensoi*. This is another dimorphic *Blechnum*, the barren fronds being large, coarse and shiny. This very often grew on the bank of the river with its feet in the water, in company with a lovely New Zealand pampass grass, *Cortaderia fulvida*, which at that season (November) was just beginning to unfurl its huge, salmon pink plumes. Quite the most exciting find of the day was what I at first took for a really quite small *Blechnum* growing



Fig. 1. *Asplenium flaccidum* in the Pillips' wild garden.



Fig. 2. *Gleichenia microphylla* at Rotorua.

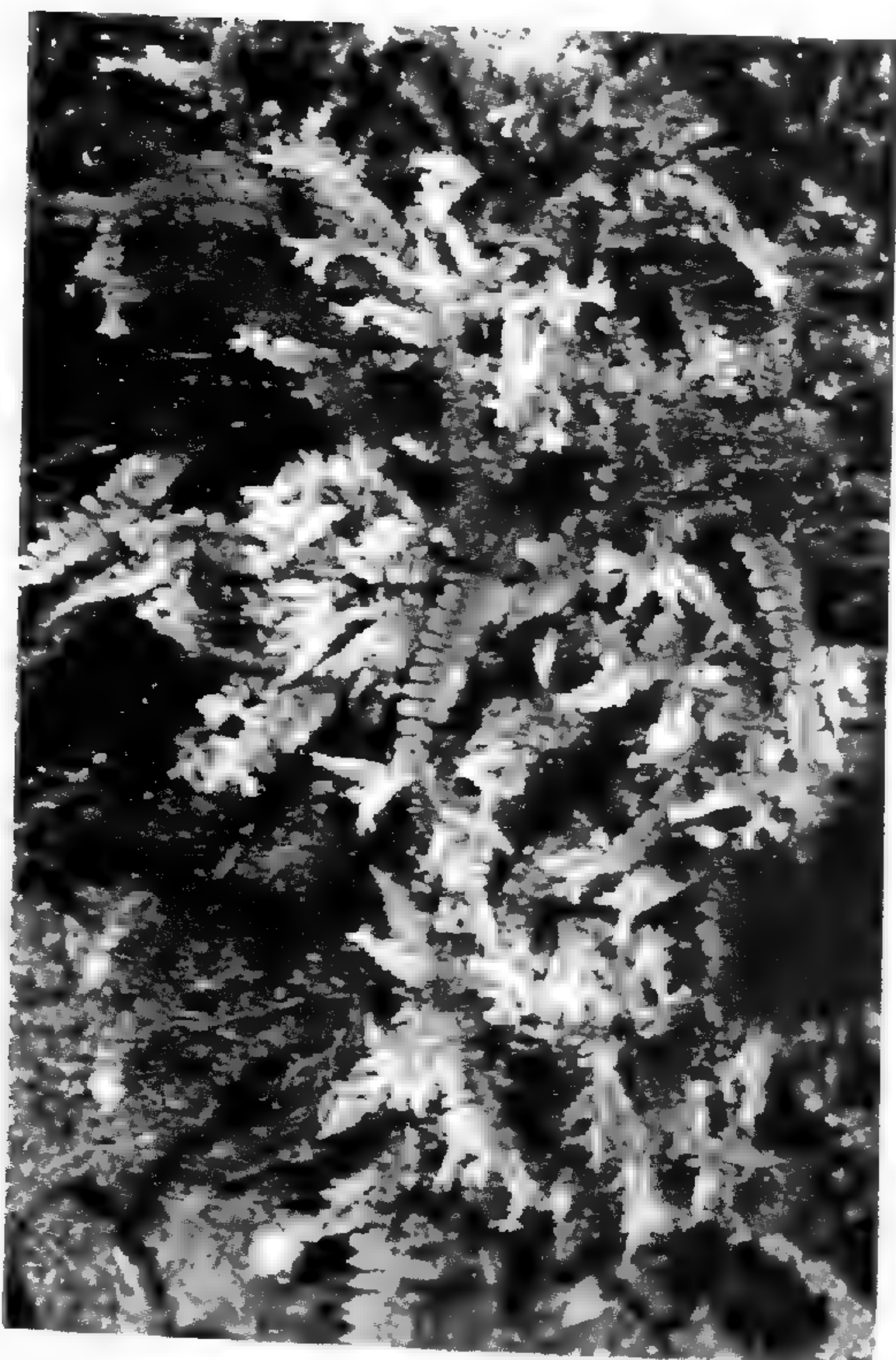


Fig. 3. The crested form of *Blechnum fluviatile* in Felix Jury's garden.



Fig. 4. *Blechnum colensoi* and *B. fluviatile* showing fertile fronds: Pukeiti.

in an area that was so boggy that clear water was visible on the surface. There was a patch of this fern about the size of an average living room, the upright fronds no more than 10cm long. It was only when we looked at the trunks of the trees growing out of this bog that we realised what the fern was, for the trunks were covered in thin, slightly hairy aerial rhizomes from which sprang typically pinnate *Blechnum* fronds, the fronds which became larger the higher up the tree they occurred. This was *B. filiforme*, the only climbing *Blechnum*, and one of the few high-climbing New Zealand ferns. It was the only time we were to encounter it, and it was an unforgettable meeting.

After that we had three or four days of lecturing, after which we set off for Mark Jury's nursery, going by way of that most famous of New Zealand tourist traps, the hot springs at Rotorua. Nothing quite prepares one for this, neither the picture postcards nor cine films, for it is the sheer smell that makes most impact. The whole place stinks of Hydrogen sulphide, and much of vegetation is covered with deposits of sulphur. But it was here that we came across another of those ferns that I had always wanted to obtain, the exasperating tangle fern, *Gleichenia microphylla* (Fig. 2.). I say exasperating with good reason, for all the books say that this fern is impossible to cultivate. When you see how it grows in the wild you just have to believe this. It grows in full sun, either in the bare earth, or in short, rather sparse grass. The soil is volcanic trash, bright red and the texture of clay, with a pH so low that any horticultural text book would tell you that nothing at all would grow there (indeed sulphur is used to lower pH, just as lime is used to raise it). On top of that the tangled, bracken-like fronds are encrusted with sulphur, almost preserved in it, and as often as not their roots are watered by one of the hot springs. The water quite literally comes out of the ground at boiling point and, where the roots of the tangle fern are, it is still so hot you cannot put your finger in it. I imagine one could only cultivate this fern if one were to grow it in a bucket of acid on top of the central heating boiler.

Mark Jury's nursery at Gisbourne was paradise by comparison. It is famous chiefly for its camellias, some of which are now obtainable in the UK. The nursery was started Mark's uncle, Felix Jury an avocado pear farmer who is now known around the world for the arborescent magnolias he has raised. The garden was a real plantsman's paradise with wide, sun-drenched borders filled with cacti and succulents and all sorts of exotics. Beyond these was a small woodland of exotic trees on which were cultivated all sorts of orchids, bromeliads and ferns. At the entrance to the wood were several plants of *Lastreopsis velutina*. This lovely, very finely-divided fern is perhaps truly endemic to that part of New Zealand for, although always an uncommon fern, it is most usually found in the drier coastal districts, of which this was one. More exotic though, was a plant of *Sticherus cunninghamii*. This is another of those New Zealand Gleicheniaceae which, like the *Gleichenias* of the sulphur springs, is reputed to be impossible to cultivate. It turned out that it was not really being cultivated, it just happened that it was now growing there. In his youth Felix Jury had roamed all over New Zealand exploring the country and learning about the plants. On one occasion he had stumbled on this *Sticherus* and, on looking closer, had discovered that it was growing on a large slab of slate-like rock. He had carried it home on its rock where it is still growing to this day. It is a most extraordinary fern for the old fronds remain on the plant, turning a rich, rusty brown and becoming the texture not so much of leather as of wood. They are so hard and stiff to the touch that they might have been carved from solid oak. But the *pièce de résistance* was a plant of *Blechnum fluviatile* (Fig. 3.) which bore at the tips of its fronds the most enormous crests. It was the only example of variation in a New Zealand fern that we saw during our visit. With great generosity Felix Jury split off a huge chunk for me to bring home. Unfortunately I had to leave it behind in New Zealand with a nurseryman to get a phytosanitary certificate to send it to the UK, and he apparently lost it. I have some pressed fronds to prove that it really exists, but it's not the same as growing it.

We stayed that night in Gisbourne and the next day for Pukeiti, which is New Zealand's equivalent of the Savill Garden, a mecca for devotees of the rhododendron. It lies on the slopes of Mount Egmont, which is an intermittently active volcano and looks for all the world just like pictures of Mount Fuji, with its snow-capped cone emerging from a skirt of cloud. What we did not realise as we set off for the lower, sun-lit slopes was that Pukeiti lies neither on the sun-lit lower slopes nor on the snow-capped cone: it lies just where the clouds rest. We spent most of our visit in the tea-rooms watching the rain teeming down as apparently it usually does at that time of the year. We did however make one quick sortie to what is known as the Water Wheel, a corner of the garden that is almost legendary for its fabulous ferns, and in spite of the rain we were not disappointed. The water wheel itself is situated in a very deep, narrow valley, rather like one of the Devon coombes, with a river flowing over the water wheel and then along the valley: the sides are clothed in large trees so that very little light gets in. The water coming over the water wheel and falling into the river creates a fine spray which, in those windless conditions, just hangs in the air. The water wheel itself, the little brick building behind it, and every rock and tree trunk for yards around were clothed with filmy ferns, so many and of so many different sorts that I could not even begin to list them. For a lover of ferns, this was indeed this was a heaven beyond one's wildest dreams.

On the steep banks that made up the sides of the valley grew innumerable plants of *Blechnum fluviatile*, and slightly lower down, in darker and damper positions grew great colonies of *Blechnum colensoi* (Fig. 4.), its fronds literally dripping wet from the spray. Both of these blechnums are very conspicuous on account of their dark, wispy fertile fronds. But the gems of this valley were the King fern, *Marattia salicina*, remarkable more for its size and its coarseness than for its beauty for, with frond stipes as much as 1m long and blades as much as 3m long, this must be one of the largest of all terrestrial ferns, and the so-called Prince of Wales Feathers, *Leptopteris superba*. This is often mentioned as being one of the most beautiful of all ferns and it is indeed an absolute beauty. It forms a rosette of quite extraordinarily dark green fronds, the surfaces of which were covered in fine droplets of spray. The fronds are tripinnate, but the segments are very close together, making a very dense mass of greenery. Although not a filmy fern, it requires virtually the same conditions of coolness and constant atmospheric saturation, though having said that, it grew further away from the source of the spray than either of the *Blechnum* species or the *Marattia*.

Our final trip was up to the Coromandel Peninsula, if only because having swum in the Tasman Sea at Kawhia Beach we thought we ought to take a dip in the Pacific too. Having had our dip we set off to find Cathedral Cove, famous as the place where Captain Cook first set foot on New Zealand. It is a most spectacular place. To reach the cove you have first to ascend what seems like half way up a mountain, and then descend a very steep gradient to the cove. The cathedral is a natural rock formation. Like any cove, this one was closed at each end by great cliffs of rock, but in one of these cliffs was a huge cave open not only on the cove side but on the other side too, so that one could see right through the rock to the sea beyond. The domed roof of the cave is apparently the largest naturally-occurring unsupported structure in the world, larger than the dome of St Pauls.

On the cliffs around the cove we found several sorts of *Asplenium* and *Adiantum cunninghamii* which we also found in most of the localities we visited, but the most colourful fern of all we only found almost by accident because we took a slightly different route back to our car. In a small, slightly hollow plateau, halfway up the hillside, surrounded on three sides by trees and looking out towards the sea were several hundred *Adiantum hispidulum* growing in the rough grass, their new fronds brilliantly red in the late afternoon sun. They were not just tinged with red, like some of the *Blechnums*, they were really bright red, like poinsettias. Again it was surprising to find them growing in

such a sunny position. Nearby grew a fern that is still a mystery, not only to me but to everyone to whom I have shown it. Beneath the trees, in dense shade, was a hillside covered in waist-high, cube-shaped brown rocks, and over these rocks grew a carpet of narrowly elliptic dark green fronds which tapered to a pointed tip. On closer inspection it turned out that the fronds were linked by foxy-red string-like rhizomes which clung as tightly as limpets to the rocks, following their every curve and ripple. I searched over several rocks, but could not find a single fertile frond anywhere, not so much as a single sorus. It looks very like *Anarthropteris lanceolata* except that instead of the fronds arising in bunches at intervals along the rhizome, they occur singly and usually alternately, which makes it sound more like a *Grammitis*, either *G. givenii* or *G. patagonica*. Perhaps one day it will produce sori and the mystery be solved.

I think, looking back on the ferns we saw and where we saw them, what was most surprising was that half of the ferns grew in very open positions, fully exposed to the sun and to wind, while the other half grew in places so dark that one would never have planted a fern in such a position.

THE ROLE OF THE NATIONAL COLLECTION HOLDER

AR BUSBY, Croziers, 16 Kirby Corner, Canley, Coventry, CV4 8GD

The conservation of fern varieties has been largely in the hands of the amateur gardener or keen enthusiast. Public institutions, although happy to find room for a few cultivars, usually prefer to maintain collections of genera for teaching and research.

Many keen amateurs are collectors of particular genera but find the prospect of being responsible for a National Collection daunting, especially when they see the Conditions of Acceptance to which NCCPG quite rightly expects all collection holders to adhere.

These conditions are essential if all National Collections are to be maintained to a proper standard. However, it is important that potential collection holders realise that even if their collection is adopted as a National Collection it still remains their property.

Holding a National Collection involves far more than merely growing and propagating the plants. Some research on past varieties is expected and the collection has to be documented. The research need not be onerous, and the NCCPG Secretariat at Wisley carries out much of this quite unsolicited. The most important documentation required of the collection holder are records that identify individual plants and their sources. In other words, a careful account of acquisitions must be kept, including their planting, propagation and disposal.

Each plant entering a collection requires an accession number.

This is easily set up simply by generating a list of numbers from 001 to 999 in a small notebook. As each plant arrives it gets its own unique number. Simply cross off each number as it is applied to a plant and as each year passes, draw a line through the listing and begin the year with the next number. So your recently acquired plant of *Athyrium filix-femina* might have the number 93-235T. Your next acquisition might be on the 2nd January so its number would be 94-236T. The 'T' denotes a transplant. If it is a plant from a spore sowing the accession number would end with an 'S' instead. If I receive several plants of the same cultivar from the same source they all get the same number. However, if I get several plants of the same cultivar from different sources they get different numbers so as to identify the source.

If a large number of plants are raised from spores it is unnecessary to give each plant a number. Only those you select for adding to the Collection require an accession number.

Spore sowings should have a sowings number or some system that will tell you where the spores came from and when they were sown. If the spores came from the BPS Spore Exchange scheme then their list number should be documented so that through the scheme the donor may be identified.

Your note-book is a rough and ready source of numbers for your plants. The details of each acquisition should then be documented on file-cards. I suggest that the minimum amount of detail should include: genus, species and cultivar name (if any), accession number, source of origin, date received, planting location (include a map if necessary) and a brief description. The Cambridgeshire N.C.C.P.G. Group has produced an excellent file-card for plant details of which can be obtained from Margaret Nimmo-Smith. Other useful information for later addition could be details of published descriptions, cultivation notes and details of any propagation. Don't forget to allow space for detailing future events such as dates of repotting or loss of the plant.

Now the plant has been carefully documented it needs the accession number on its label. Labels are easily lost. This is especially true of labels in the garden. I always put a label in the bottom of a pot before repotting the plant so that if the usual label is lost I know that it is repeated inside the pot. This particularly applies to plants in larger pots where they may languish for years.

I also bury labels under the roots of my garden plants. This has often got me out of trouble when I come to lift plants that have lost their labels. A plastic label with the accession number written with a HB pencil will last for years underground.

A photographic record is also desirable. 35mm colour-slides are preferable to colour prints and it is useful to keep a herbarium of pressed fronds.

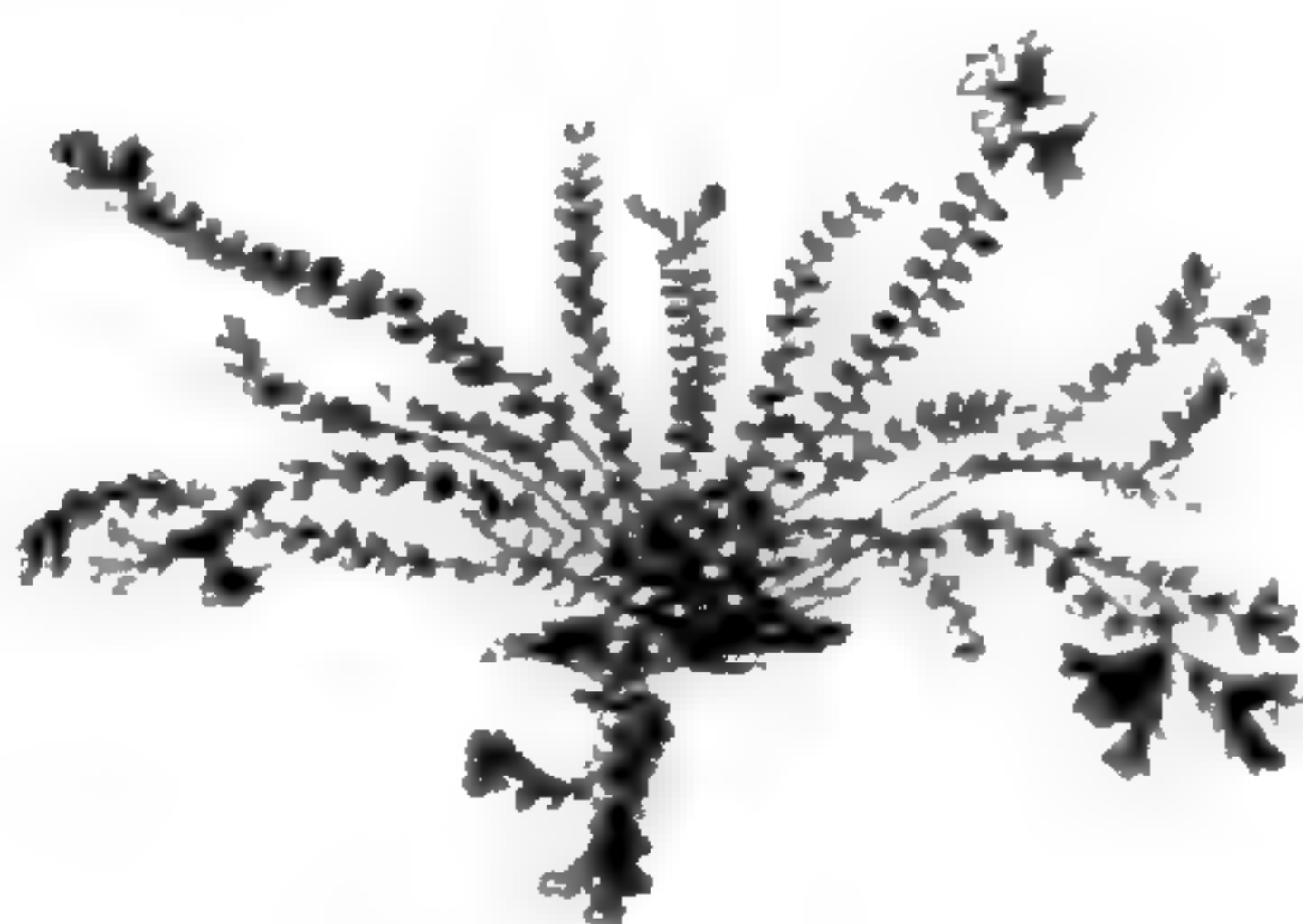
I hold the National Collection of *Osmunda*. It began in a very modest way in 1968 and now totals some twenty or so plants. Several species and cultivars are replicated from different sources so that comparative studies can be made. I have two examples of *Osmunda regalis* "Gracilis", one from an Herefordshire garden and one from Waithman Nursery. One has fronds and stipe that are bright green, the other carries green fronds with pink stipes. In spite of searching through various source books I still do not know if this is significant.

Other interesting forms that have come my way are *O. regalis* "Decomposita" found by Martin Rickard in Ireland, a red form found by Philip Coke also in Ireland and a dwarf form which came to me via Denmark, but which possibly originated in Eastern Europe. I also have the late Prof. Irene Manton's cytologically determined material which may prove useful to someone at a future date.

In summary, simply to have a collection of plants is not enough. It must be thoroughly documented and maintained for it to have value. It's not only a question of conserving plants, we must also conserve the information too.

To anyone with ambitions of holding a National Collection, I urge them to begin documenting the plants they have and any future additions; it is fatal to rely on memory.

The National Council for the Conservation of Plants and Gardens publishes a list of National Collections. For details of membership, addresses of regional group secretaries and membership, their address is; N.C.C.P.G. c/o The Pines, Wisley Garden, Woking, Surrey GU23 6QB.



NOTES ON THE FOLKLORE AND USES OF BRITISH PTERIDOPHYTES

ROY VICKERY, *Department of Botany, The Natural History Museum, London, SW7 5BD.*

Although a good deal of information on the folklore of pteridophytes can be found scattered through various publications, most of this information is of nineteenth-century origin, and it appears that little, if any, effort has been made to record twentieth-century material. The following notes, accumulated as part of an ongoing survey of British and Irish ethnobotany, will, I hope, encourage others to record such things.

Equisetum telmateia Ehrh., great horsetail: "This is uncommon hereabouts, but there is a big patch in Wychwood [Forest], and in my boyhood [?1915] I remember seeing a cottager nearby using it for scouring saucepans." [personal informant, Charlbury, Oxfordshire, February 1991].

Osmunda regalis L., royal fern, locally known as *Bog Onion*: "The root is converted into a juicy substance and used as a rub for rheumatism and sciatica; it is often found to be a complete cure. First the root is cut into slices and then pounded up into a mash. It is then put into a bottle or some corked vessel and water supplied in proportion to the size of the root. It is then left to set for about two days until it forms a thick white juicy substance." [Irish Folklore Commission's Schools' Scheme, 1937-1938, vol. 50, Co. Galway].

Pteridium aquilinum (L.) Kuhn, bracken: 1) "My mind went back over some 70 years to a childish game we played [in Scotland] called 'Holy Bracken'. Selecting a fat, juicy specimen, I used my pocket knife to sever it close to the ground and ... there it was the most perfect example of the most famous initials in the world - JC ... It is considered very lucky to find a good example." [*Sunday Express*, 17 June 1979; quoted in I. Opie & M. Tatem, *A dictionary of superstitions*, Oxford, 1989].

2) "There's a saying around here:

*Where there's bracken there's gold,
Where there's gorse there's silver,
Where there's heather there's poverty".*

[pers. inf., Newton Rigg, Cumbria, September 1988].

3) "When I was a boy [in Hampshire, b. 1918] they used to say that if you split a bracken stem you would see a picture of King Charles hiding in his oak tree. I often wondered what would have been seen by those who split bracken stems before King Charles hid in his oak tree." [pers. inf., Paddington, London, May 1989].

4) "I remember being shown how, if you make a horizontal cut through the stem (not root) of a fern, an oak tree will appear." [Bath, Avon, January 1991].

5) [During my childhood, c. 50 years ago, in Ireland] "the fern that grows everywhere - bracken - we used to pull off bits of it saying:

*Tinker, tailor, Soldier, sailor,
Rich man, poor man, beggar man, thief;
Doctor, lawyer, merchant, chief.
This year, next year, now or never.
A loaf, half a loaf, a wedding cake, a bun.
Gold, silver, copper, pig-ring, brass."*

[pers. inf., Streatham, London, February 1992].

Phyllitis scolopendrium (L.) Newman, hart's tongue: 1) "Burn a leaf called hart's tongue and apply it to burn and it would cure it." [IFCSS, vol. 500, Co. Limerick].

2) "The hart's tongue fern was used as a cure for scalds and burns. The underside up was laid on the scald or burn. Fresh leaves were applied when needed until the cure was complete." [IFCSS, vol. 650, Co. Waterford].

Dryopteris filix-mas (L.) schott, Male fern: "Some flockmasters used to treat liver fluked sheep with a weekly dose of 4 oz. of salt or a monthly treatment of male fern." [J. Barrington, *Red sky at night*, London, 1984].

So far pteridophytes are under represented in the survey's records, so any further information would be much appreciated.

SHORTER NOTE

More thoughts on Polystichum setiferum "Pulcherrimum"

Referring to my article in the 1993 *Pteridologist* (2, 4, 1993) concerning the mysterious disappearance of *Polystichum setiferum* "Pulcherrimum" in the West Country, I have received the following letter from our member Ms I.N.G. Storey:

I did wonder whether Radon might have anything to do with the increased variation among local ferns in the West Country. This radio-active gas, ^{222}Rn , occurs naturally, particularly in areas underlain by granite. It undergoes alpha decay and, as you probably know, has been of concern as a possible cause of lung cancer in the UK. Most of the homes affected lie in the south-west of England, though parts of Derbyshire and Northamptonshire may also be included. Radon may be water borne. Perhaps changes in water supply, and hence concentrations of radon reaching the ferns, may explain the change in rates of variation with time?

This is only a theoretical suggestion. A closer examination of radon levels in relation to local fern variation, followed up by laboratory tests in which ferns are exposed to known concentrations of radon, would be needed to substantiate the hypothesis.

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I welcome this as a contribution towards solving the mystery. In a subsequent letter Ms Storey writes:

I would be very happy for my letter to be considered for publication as a stimulus to discussion on the factors affecting fern variation in the West Country and the Lake District.

It will be noted that Ms Storey widens the discussion to include the tendency for all, or many of, our British ferns to produce more variation in the West Country and the Lake District¹, but I am more concerned with the fact that *Polystichum setiferum* "Pulcherrimum" appeared suddenly for only a short period of about 20 years, during which time it was most unstable and disappeared again completely, whereas the other types of variation are with us all the time.

I hope that other members who may have constructive theories or thoughts on this matter will make them known to me or our editor.

JW DYCE

¹ Is this not simply a reflection of greater fern diversity, larger fern populations and increased pteridologist activity in these regions? (ed.)

SHORTER NOTE

Asplenium scolopendrium ("Ramosum transverso" form)



About three years ago I was ambling round a wild area in the Yorkshire Dales with a land-owner. There was not much in the way of ferns except a few *scollies*, some of which were slightly undulated. I noticed about ten feet up a limestone rock face which was totally shaded by deciduous trees a perfect *Asplenium scolopendrium* ("Ramosum transverso" form) growing on a ledge. As far as I was concerned it was inaccessible, so I asked my host if we could return later with a light ladder so that I could collect some spores. "There's no need to go to all that trouble" he said and, in no time, he had found a few toe and finger holds and climbed up onto the ledge. "There are two or three plants here" he informed me, "would you like one?" I'll give you just one guess what my reply was. He literally peeled a plant off the ledge where it had rooted in the organic debris which had accumulated over many years.

What a plant it was! Well grown, complete with undamaged root and about four pounds of natural compost.

Back at home I found a place for it in a limestone rockery, and all went well until the new fronds appeared the following year. These were all, without exception, ramoso but with no sign of the transverso feature. In both 1992 and 1993 it still produced the ramoso only form.

I wonder whether anyone else has come across this phenomenon and are there any suggestions why it should happen? The main differences between the site in the wild and in my garden is that the garden is colder and windier. In the wild, of course, the fern had a natural annual mulch of leaves. I am still hoping that it will eventually return to the form it had when I first found it.

JACK BOUCKLEY.

FERNS ON CHALK

RN TIMM, 'Aldre', Grimsby Road, Binbrook, Lincolnshire, LN3 6DH

Recently having moved into a new garden on a chalk soil and wanting to grow a number of calcifuges, the problem of building some sort of acid bed faced me. Usually, of course, this means a structure built of peat. This did not appeal greatly, partly because of the great expense - this form of acid bed requires large amounts of peat, including the more expensive peat blocks - and also I am concerned about the environmental damage caused by peat digging.

The obvious alternative to peat is topsoil which is often available from farms, building sites and quarries. Sand and gravel quarries are especially likely to be good sources of suitable soil as deposits of sand and gravel often underlie areas with an acid topsoil. Some quarries sell topsoil as a regular trade, but generally topsoil is where you find it, and mine came from a farm where ground had been cleared to erect new barns. The farm is on the edge of sandy heathland and birch woods, therefore the soil has a low pH, but it is sandy and free draining. This last feature could of course have been a problem, as many of the calcifuges that people (including me) like to grow in a garden are thought to prefer humus rich, moisture retentive soil. However, the soil (which cost me nothing) formed the base of a compost mix. To it I added a quantity of spent potting compost from the greenhouse, some of which, it is true, was peat based, though a lot contained coco fibre. The peat had been paid for and recycled. I also added a small amount of garden compost (made without lime), perlite and vermiculite. The last two were only present in small amounts relative to the whole, but they should still have improved moisture retention a little. Bonemeal and a small quantity of artificial fertiliser were also used to boost fertility. With these additions sand would probably have done just as well as topsoil for a base, but soil (or old turf which could have been used) will help insure against the possibility of any major deficiencies. I would not recommend recycling spent compost for growing plants in pots, however, given time to weather and the replacement of some fertiliser, it should not cause too much of a problem in the garden. Leaf mould could also have been used for humus, but this was not available at the time. If using leaf mould it might be a good idea to test its pH, or at least to avoid beech leaves, as I believe those to be very alkaline. The added fibrous materials eventually came to about a third of the volume of the finished compost, and still gave a top dressing of about half an inch. I am content with this, since many plants are happy with this sort of mixture when growing in pots and, in the wild, many calcifuges are found growing in a thin layer of fibre rich soil over sand.

The walls of the bed are made of old bricks to a height of about forty centimetres. Only the front side is cemented together on a shallow concrete foundation as this allowed the final shape to be flexible and saved on construction time. It would have done no harm to have cemented the whole, as the lime which leaches from good cement is negligible, indeed it is possible to grow calcifuges in cement containers. To encourage water retention the sides of the bed were lined with polythene, tucked under the top layer of bricks, and draped about a foot or so across the base of the bed. When finished, the bed measured eight feet by ten. A wide peat bed is, I believe, less prone to overheating, freezing and drying out, than a narrow one. The centre of the bottom and one end of the bed were left unlined to allow drainage to occur. Finally the walls were capped with some old sandstone copings, purely for ornamental effect.

To date only a small number of plants have been tried in the bed as space is being left for a hopefully expanding collection. However, the ferns *Gymnocarpium dryopteris*, *G. dryopteris* "Plumosum" and *Phegopteris connectilis* have survived a winter and two summers, and have at least doubled in size. *Blechnum spicant* died, but I suspect this was due to lack of shade for the trees which are planted nearby to provide shade are small as yet. A *Dryopteris erythrosora*, a *Magnolia stellata* and an *Actaea* have also survived one year and are doing well.

On this basis alone then, I think it would be fair to consider the bed a success and to recommend to anyone considering peat bed construction a break with tradition. The range of options and materials is truly enormous - far wider than I can list here - and there is great scope for improvisation and experiment.

Incidentally, it is perhaps always worth trying plants thought to be calcifuges in an alkaline garden, as a number of ferns listed as lime sensitive by some of the books I

have consulted, seem to do quite well in my garden. In particular *Onoclea sensibilis*, *Matteuchia struthiopteris*, *Osmunda regalis*, *Athyrium filix-femina*, *A. nipponicum*, *Dryopteris wallichiana* and *D. affinis* grow well, despite the fact that I have found all of them, at one time or another, listed as calcifuges. The strength and type of your lime must have a great influence of course, so what works in my garden may not apply everywhere. *Athyrium* and *Onoclea* do show slight paleness of the fronds, but this does not seem to affect their vigour. *D. affinis* and *D. wallichiana*, which I used to grow in pots of peat compost, never showed their classic golden colours until planted out in the garden. Perhaps a lot of golden colouration is due to mild chlorosis, and is not inherent in the variety as is often thought. Indeed, some of my hart's tongues are colouring up nicely too.

THE FERN SUPPLIERS

When I took over as editor of *Pteridologist* I wrote to all of the BPS members who supply us with ferns, those who advertise inside the back cover. I suggested that if each would write a brief article about their nursery and the plants they have for sale we might all benefit. In this issue we have contributions from the relatively new nurseries of the Rickards in the West Midlands and Neil Timm in Lincolnshire. I hope that other professional growers - and not just in Britain, for this journal has an international readership - will now feel encouraged to send material for publication next year - *James Merryweather*.

THE FERN NURSERY

RN TIMM, 'Aldre', Grimsby Road, Binbrook, Lincolnshire, LN3 6DH

The history of this nursery is brief, as I only started to grow ferns some six or seven years ago and, though the idea of starting a nursery to complement an existing landscaping business was there from the beginning, it had to wait for a change of address two years ago to begin in earnest. This, however, gave me time to gain a little knowledge, mainly with the aid of the BPS. I little knew at the outset just how challenging fern growing could be.

The nursery is, at the present time, only small with a limited range of stock. The trade is mostly wholesale at the moment with a retail list of some 30 plants. Small numbers of other ferns, plus some perennials etc. are to be had by callers. Many plants are being raised to fill a new garden on an empty site. It is intended that the nursery should be accompanied by a display garden, as I feel this will become an increasingly important feature of nurseries in the future. Our soil is a medium to heavy, mildly alkaline alluvial loam with some pieces of chalk. The garden has the advantage of a small stream which is very alkaline, and it lies in a valley at an altitude of 70 to 80 metres. Most of the stock is raised in a polytunnel without heat to maintain hardiness. My main intention is to try to build up a good range of both British and exotic fern species, though I am not entirely opposed to cultivars. A current pet is *Paesia scaberula* which I feel has great garden potential in this country, as it seems to be very hardy, even in the north-east, seems to like a wide range of soil types, and to stand full sun.

Since I take a conservationist viewpoint coco fibre composts have been tried in the nursery with such great success that I am now planning to go over to their use entirely. Indeed I feel that these composts could have been made with ferns in mind, their great advantage being that they are free draining and do not "cake" in the way that peat based composts do.

The nursery is usually open from April until October, especially at week-ends. At other times it may be as well to check if you're travelling a long way. The plant list is sent out in return for two first class stamps. Minimum mail order is £5 plus 20% p & p. Please write for specific prices.

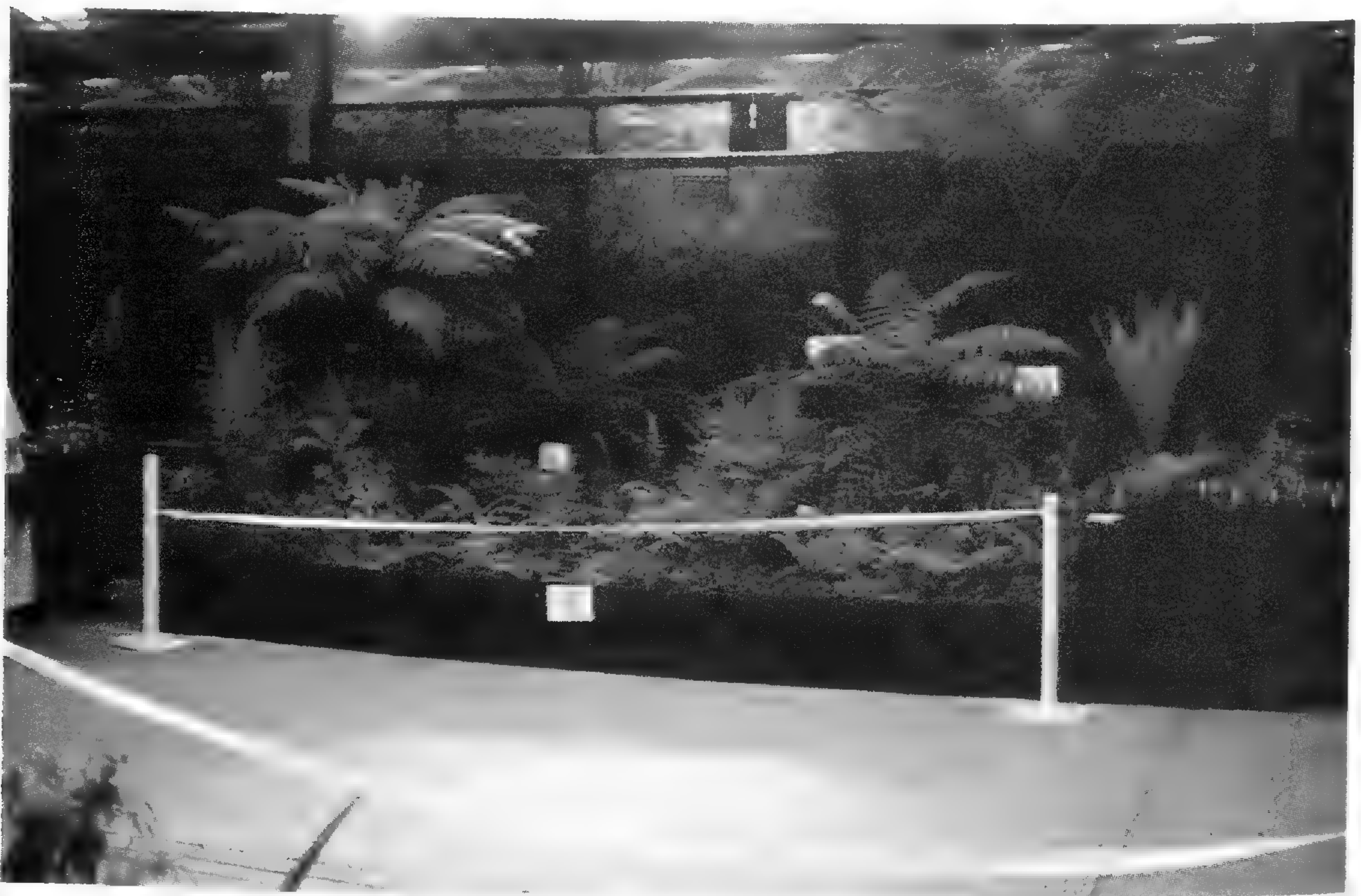
RICKARDS HARDY FERNS

MARTIN RICKARD, Kyre Park, Tenbury Wells, Worcs. WR15 8RP

On and off, since the 1960s, I have toyed with the idea of having a fern nursery. Many members have dabbled, and will continue to dabble, but for anyone in full-time work it really seems just about impossible to run a nursery as a sensible commercial business.

Our opportunity to take the plunge came in 1988 when the children were more or less independent and my wife, Hazel, started to have spare time (not for long!). With my fern collection and her propagating skills we reasoned we could build up an interesting stock fairly quickly. We set to sowing spores in vast quantity and gradually plants came through the pipeline to a saleable size. Production was slow, often taking 3 years, because we lack the proper facilities of heated glass. Cottage industry fern production was the problem. Window sills are fine when sowings are modest, but trays of pricked-out ferns soon mount up and become impossible to house in a domestic setting.

Nevertheless, with the aid of converted sheds and polythene tunnels, the ferns arrived at maturity in a steady stream and we were getting more confident we could make a go of it. In 1991 we took our first big gamble. We applied to take a nursery stand at the Malvern flower show which is jointly run by the Royal Horticultural and Counties Agriculture societies. Fortunately our application for space was kindly supported by Hazel Key of



Malvern, 1993

Fibrex Nurseries, and we were accepted. The Malvern Show is in early May, very early in the fern season. Without greenhouse heat we wondered if we had bitten off more than we could chew. Anyway, we did our best with our display measuring 10 feet long by 6 feet deep and, to our delight, we won a silver gilt medal. This show raised public awareness and improved sales. We exhibited again in 1992, and this time with a display 15' x 6' won an RHS gold medal which was a tremendous thrill for us both. Our display featured hardy and half-hardy ferns, mainly hardy but with liberal use of tree ferns to gain height. In 1993 we entered again, worrying we wouldn't be able to repeat the gold medal standard. We tried as hard as ever and shocked ourselves by winning a gold again, plus the 'Best in Show' award, absolutely amazing for a green display among all the colour on show from the hundred or so nurseries in the hall!

All this publicity was giving sales a slow nudge so we decided in 1993 also to have a go at the Chelsea Flower Show. We were accepted, surprisingly, and asked for - and got - a tiny pitch in the great marquee (9' x 10'). After Malvern, staging at Chelsea is very difficult. Transport distances are a problem, and entry and exit to and from the show site are very restricted. We made our biggest error by taking too many ferns, and the lorry couldn't wait until we'd staged our display, so we couldn't send spare ferns back home. The end result was a very green display, but it was, sadly, slightly overcrowded. We were awarded a silver gilt medal which was, nevertheless, a very satisfactory result from our first attempt. We will be having another go this year at both Malvern and Chelsea. I just hope we can keep up a reasonable standard.

Showing ferns is great fun, hard work, but great fun. It does help sales considerably, but it all needs back-up, and fern production is crucial. As a result I have taken early retirement from my job and now work full-time on the nursery with Hazel. We are aiming to broaden the range of ferns on offer.

My retirement is not the only gamble we are taking at this stage! We have also decided to move house, nursery and garden to a much larger property at Kyre Park, Tenbury Wells in Worcestershire. We have taken this step in a joint venture with some long-standing friends, Jon and Janet Sellers, who will have their own business while we have the nursery, co-operating whenever necessary. Hopefully we will be completely moved to Kyre by late spring or early summer.

The grounds at Kyre cover 29 acres with 20 or so down to garden, established long ago in the picturesque or *ferme ornée* style. So far, we can find no information about the grounds prior to 1754 when the present shrubbery was laid out as part of the modifications of the whole estate by Edmund Pytts. Mystery surrounds the design. Was it laid by "Capability" Brown, or was it simply designed in his style? There appears to be no documentary evidence of any involvement by Brown, but Mrs Baldwin-Childe, who lived at Kyre from 1880-1930, clearly believed that he was consulted whilst undertaking his principal work at Croome Court. Recently we have learned that a Mr Davenport was part of a team which was involved in the operation, but was he the designer or merely a site manager for someone else?

Subsequent information about the grounds is relatively sparse but, writing in 1905, Mrs Baldwin-Childe gives some useful insights. She says that the bridge in the shrubbery was built in 1754 and implies that other features date from the same time. These include 5 lakes, a *ruin*, a hermitage, a small grotto, a tunnel and several cascades and waterfalls.

Today the whole area is rather over-mature with many trees now gone or about to blow over. The ground vegetation is rank, with abundant brambles, nettles, elder etc. However, the bones of the garden are still as they were in 1764 - a remarkable survival. Of particular significance to me is that the ground is damp in places all year round. I am hoping, and expecting, that the ferns will thrive. Even now there are plenty of ferns

present, most frequently *Dryopteris filix-mas*, but *Asplenium scolopendrium* is common and *Polystichum setiferum*, *D. dilatata*, *D. affinis*, *Athyrium filix-femina* and *Polypodium interjectum* occur here and there. On walls we have at least one wonderful colony of *Asplenium ruta-muraria*. For lovers of horsetails, we have them too, with possible *Equisetum x littorale*!

We are currently working to get the garden respectable so that we can open it to visitors at Easter. By this time the garden will, at best, be "opened up" - not tamed, but we hope visitors will enjoy seeing a mid-eighteenth century garden prior to restoration and, perhaps, they will return and see our progress and fern plantings over the seasons. We are also planning to move our nursery by Easter. This might be over optimistic, and only time will tell.....

PHOTOGRAPHING FERNS

C N PAGE. Royal Botanic Garden, Edinburgh EH3 5LR

This article is the second part of an article whose first part was published in two sections in the Pteridologist 2 part 1 pp 47-48 (1990) and 2 part 2 pp 73-75 (1991).

I dedicate this part to the memory of the late Dr Anne Sleep, who, in her earlier days, was an unsung but usually excellent fern photographer.

PART 2: CAPTURING YOUR QUARRY

Lenses: Something to look through

Modern through-the-lens metering cameras usually accept a variety of interchangeable lenses. For picture quality and clarity, I find that several (mine mostly ancient) interchangeable lenses can give far better quality results than a single modern zoom (I presume because there are fewer elements involved). They are also less likely to be damaged through strenuous field use. I find that a useful selection is, in addition to the standard 50 or 55 mm lens, at least a wide angle and a macro.

The standard lens 'sees' about the same angle as does the human eye (say about 45 degrees), and so pictures taken with such a lens most closely resembles that seen by the human eye. The wide angle, by contrast, 'sees' a much wider angle (say perhaps up to 75 degrees) and hence larger area, and compresses this into the same frame area and hence into the same sized ultimate slide or print. I find that a 35mm lens is the most generally useful wide angle to carry, usually used more often for habitats than for plants, and that a 28 mm is especially useful for woodland or ravine habitats, where the alternative of standing further back from the subject is impractical or gets a clutter of trees in the way. For example, most of the habitat shots in my New Naturalist book were taken with my 28 mm Soligor lens, now 25 years old !

For individual fern portraits, however, I find the standard and macro lenses are the most useful. The latter is especially adaptable for the smaller species (such as many *Asplenium* in Britain) or for close-up details of larger ones (such as details of pinnae of a *Polystichum* or *Dryopteris*). This adaptability of the macro is achieved through its close-focussing ability, which can be only be similarly achieved with a standard lens by the addition of several close-up rings, and with the resulting loss of stops. Further, a macro lens construction is optimised for such close-up distances, rather than for operation at infinity, and so is inherently better at good close-up definition.

If you are using a single-lens reflex camera, which most modern cameras are, then whatever the lens you attach, the picture that the film 'sees' and records is the same as that which you see through the view-finder. The construction of such cameras allows

lenses to be removed and changed while a film is still in the camera, though I still prefer to do this with the camera in my own shadow. Such interchangeability also allows opportunity to carry more than one body, especially on expeditions. This means that different films can be exposed (such as colour and black-and-white), and has the added advantage of a reserve body should one fail under sudden heavy use (it is surprising how often this can happen in the field).

Films and things

Undoubtedly the most important thing about film is to remember to bring one. The second is remembering to actually put it into the camera (and, if changing between films of different emulsion speeds, setting the appropriate camera film speed-rating scale to match). After this, the rest of the decisions about films are very much downhill.

Forgetting to load a film can be surprisingly easy to do, especially when the excitement of the chase of actually finding a rare *Ophioglossum*, *Pilularia* or strange hybrid horsetail, or a mountain-top *Dipteris* or *Stromatopteris* in the tropics, completely dislodges mundane thoughts about loading a film from the fore of one's mind. If in doubt about whether you *did* load one the previous evening (I frequently am), try ensuring that the take-up spool wheel also turns round when you wind the film on - that proves there is some physical connection internally between the two spools of the camera, and with a bit of luck, it could be the film you couldn't find that morning. Such careful observation while winding on, is something I regularly remember to do as a matter of habit - usually at least half a second after I should have actually noted it! If, at the end of the day, however, you have taken a whole series of particularly attractive shots on a film that turns out to be still in your rucksack, or even worse, still in the fridge amongst the lettuce back home, I recommend carrying a hip flask containing something worthwhile for the odd such inevitable occasion. It doesn't repair the damage, but you feel a lot better about it!

Having mastered the art of loading the film, you can then get down to the finer philosophical points of considering just which film you should actually be using. Somewhat inevitably, this becomes a question like how long is a piece of string, combined with all sorts of unfounded preferences and prejudices. It all depends, of course, what you are doing and why you are doing it, and for those of us who may not yet have found an answer to this fundamental end-of-the-Universe type of question, the subsequent choice of film can be equally enigmatic.

However, a sufficient array of film types and speeds is certainly generally available justifiably to totally baffle the faint-hearted. Most books will tell you that for the finest quality images and the best colour resolution, choose the slowest speed film compatible with what you are doing. Film speeds are rated in ASA numbers, printed on both the box and the cassette (ASA numbers are equal to and also called ISO numbers in recent years, just to add to the confusion). As a general rule, films in the 50-100 ASA range are usually to be recommended for most general purposes, but for the dark places where ferns usually grow, I find these too slow, and have regularly come to use 100 ASA colour and 400 ASA black-and-white. It is all a matter of compromise between gaining the best quality image and what is practical and really works well in the circumstances of your sort of photography.

In terms of brands of film, it is a further matter of horses-for-courses, and individual likes and dislikes. With colour the choice is more critical than with black-and-white (for there is more differences to appeal to personal preferences). For colour, my own impression is that Kodachrome is excellent for red and yellow subjects, while I find the old Agfachrome and newer Fujichrome both better generally for subjects which are predominantly brown and green (but, for good fern greens, I recommend not to go higher than 100 ASA in

Fujichrome). As ferns are mostly brown and especially green, I tend use the latter. Some people find these greens too rich, however, and for them, perhaps Ektachrome colours might be a good compromise. The only way forward is to try them yourself, as see which you prefer on your sorts of subjects.

Lastly, as general rule: don't chop and change. Having found a speed and make of film that you like, stick to it, especially on expeditions. If you have to change, then do so where you can repeat the experiment, such as in your own back garden. If it does not work out right first time, you can repeat with something else and compare the results. It's a big mistake to go off to some distant end of the earth, where you will never be again, and to use a film that you have never tried before, no matter what recommendations it came with or from whom!

Lining-up your fern

Picture composition is undoubtedly the aspect of photography which requires more of the eye of an artist rather than to follow strict scientific principles, and this is the single most important factor in achieving a picture which is pleasing to the eye, as well as technically correct. Ferns can pose their own scale of problems in this respect, and turning a truly wild scene into a good permanent picture is certainly the major personal contribution which the photographer makes to his/her photographs. There are thus few rules to go by, other than trying to achieve what is and what is not most pleasing to you, personally, as well as scientifically accurate.

My main tips with ferns are consequently few. Mainly they are to choose views in which the subject in question, whether it be a single fern or a whole habitat, makes a strong and unequivocal statement to the eye as to what the particular photo is all about, and what its message is. For a photo without a message is of little value. Choose plants that look good. Select angles on them that makes the fern stand out well against its background (often even more difficult in black-and-white than in colour). Try looking for a way of naturally framing a subject, and decide whether a horizontal or vertical pose is the more pleasing and easier on the eye.

Put the subject clearly and wholly in the frame, although everything exactly in the centre of each shot can look dull, repetitive and boring. If going for an off-centre pose, then balance the components and appearance of each view as one would an off-centre see-saw. If a plant leans one way or the other, it can look good. Capitalise on this, but make sure that your plant leans *into* the frame and not *out* of it. For reasons I don't understand, a subject leaning left to right often looks better to me than one leaning right to left - so some field orientation of the viewpoint might be involved. Further, a fern leaning totally *out* of a frame looks dissatisfying, and can appear to be trying to escape!

Develop an eye for shades of intensity as well as colour harmony and, whilst I'm on the subject of harmony, avoid clutter and distracting detail and clumps of plants in discordant numbers. (I don't know why, but to me one plant usually looks OK, three look OK, but two or four individuals look respectively awful and confusing - perhaps because there is then not one in the middle). If there are plants of other species around, try either to include them or exclude them completely (depending on the purpose of your photograph) - a small portion showing is usually acceptable, but don't cut a plant in half on the edge of the frame - this is merely irritating to the viewer. And don't have anything in the foreground which is out of focus, unless it is for special artistic effect.

Lastly on angles, not too many ferns are at their best purely in profile or in plan view. Most gain naturalness of effect, and many a considerable delicacy of grace, when viewed in a three quarters direction. So choose your viewpoint carefully, and do this also

in relation to the angle of incident light (be aware of the possibility of lens flare at certain angles and shade the lens when necessary) - try a few different directions until you are happy with one. If there is flare, add a lens hood or shade with your hand (I have a very adaptable field lens hood that doubles as a hat!).

Filtering the light

Photography is, to me, all about capturing an ephemeral image made of light. So an eye for the best light to begin with can be a useful part of the whole process. Nature can be hard with light, especially where strong sunshine shafts contrast with dense, dark shadows, and methods of softening the light to a range with which the film can cope were touched upon in a previous part of this account. To summarise: choose your day carefully, and avoid hard, contrasty light. I find that bright, soft, still mornings are often best.

Filters provide another way of modifying the light, and are used to give a film's emulsion an image that it can better cope with, or to gain a particular effect. Most do so by altering the spectral content of the light, some its plane of polarisation. Thus UV filters can be used to correct an overall blue cast in sky shots or distance haze, while yellow ones in black-and-white photography will deepen the contrast of a blue sky and make lighter foliage stand out more prominently.

For ferns, however, I find that the single most useful filter to have (and which I constantly use) is a polarising one. The main rôle of this is to remove irritating bright surface reflections from glossy frond surfaces, such as those of *Polystichum aculeatum* or *Phyllitis scolopendrium*. Such a filter also softens potentially hard reflections off other adjacent glossy surfaces within the field of view. This can be especially valuable in black-and-white work. In colour photography, such a filter can also enhance colour saturation of the image. Of course, the filter has to be rotated to find the angle of maximum reflective occlusion for each individual shot, usually transversely to the direction of incident light at the time, and there is about 2 stops exposure loss when this is achieved. This loss can be a problem in its own right in dark places, and tripods in such circumstances are essential.

Exposing your fern

One of the great photographic problems with most ferns is that they can be large and usually present a rosette of fronds spreading in all directions. They thus require a considerable depth of field if all parts of the plant are to appear acceptably sharp. This, of course, requires the lens to be stopped down as far as practical, which is a diametrically opposite requirement to the need to gather as much light as possible often in gloomy surroundings. If my recommendation to use a polarising filter is also adopted, this compounds the darkness problem still further. Unless you are using flash (I never do, because this flattens the subject and can look very un-natural), this all adds up to an essential requirement for long exposure of as much as a minute or more (sometimes much longer).

Such periods of exposure, of course, require both your camera and your subject to remain absolutely rock still. The camera you can clamp to a tripod, the fern you cannot. And, of course, it is always in the darkest of places, such as along deep rocky ravines of cascading stream-gorges, that the largest, often dramatically three-dimensional and most luxuriant ferns typically grow, with glossy, highlight-reflecting wet surfaces that need to be softened down! Meanwhile you are probably standing up to the tops of your wellies in fast-moving deep cold water, perched precariously astride two slippery green boulders, watching a fern whose fronds are constantly quivering at the tips in the updraughts of

cascading water, and the constant dribbling of a myriad of droplets from dripping cliff faces above!

It is certainly this combination of poor light, great depth of subject with exacting detail, and fronds which are twitching at the tips (not to mention the tired photographer), that conspire to make fern photography, which may seem like such a good idea at the time, so exacting and challenging in the actual achievement. A good photograph of Brittle Bladder-Fern (*Cystopteris fragilis*) in such circumstances can certainly be held-high as an achievement in photographic patience! But don't be too daunted. It *can* be done. Good luck! Keep at it, and keep your affection for ferns. Photography is one good (and often infectious) way of passing this on to others, to the benefit of an ancient, and visually especially attractive group of plants.



SHORTER NOTE

The new Dryopteris variety that wasn't

The following story began in the summer of 1991, just before I joined the society. Near to my mother's house in the village of Westfield, just north of Hastings, is a steep footpath along the banks of which grow a number of ferns: *Dryopteris dilatata*, *D. filix-mas*, *Athyrium filix-femina* and *Polystichum setiferum*. I noticed an unusual looking *D. filix-mas* frond poking out from the hedge on the bank. When I looked more closely I could see that the edges of the pinnae were rolled up. At first I assumed that some insect was responsible, but could find no evidence. I searched in the hedge for more fronds and found four more with the same rolled up pinnae. I considered digging up the plant, but it was possibly growing in someone's garden so I left it. It had green sori, so I decided to keep a close eye on it and collect spores when ripe.

I went back to check every week until about two weeks before I had estimated that spores would be collectable, when I discovered that the fern had been strimmed. I dug it up.

I potted the plant up as soon as I reached home, hoping that it would recover quickly and send up new fronds, but it was too late that year. During the winter we moved house and I selected the best spot in the new garden to plant my discovery with plenty of compost. I waited. At last new fronds began to unfurl and the lowest pinnae seemed to be small and stunted compared with other male ferns I had. By mid summer I had to admit that, however much I wished to see marked differences in this plant, they were not there.

I remembered reading the experiences of one of the Victorian growers who described moving a number of varieties of *Asplenium scolopendrium* to new sites where all reverted to normal. When he replanted them in similar conditions to their those at their original homes they gradually returned to their varietal forms. I decided to try this in the spring of 1993 since I have a small, shady bank topped by a hedge at the side of the house. The fern stayed annoyingly normal. I would very much like to know what made the pinnae roll in the wild.

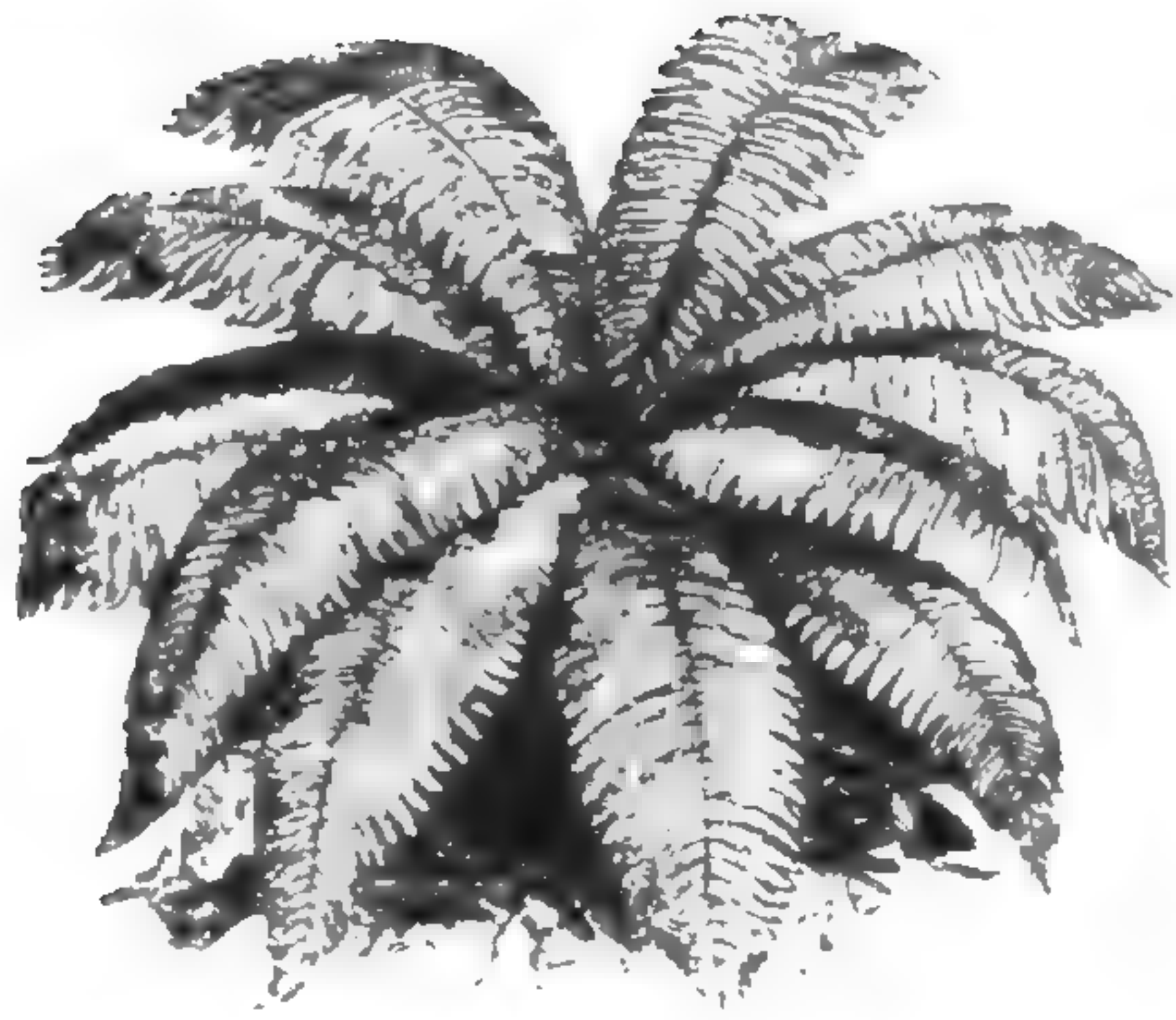
MARK BORDER

BPS BOOKSALES

BPS Special Publications

1. Rush: Hardy Ferns
2. Dyce: Fern Names & their meanings
3. Dyce: Cultivation & propagation of British ferns
4. Camus: The history of British pteridology, 1891-1991
5. BPS abstracts & papers, 1894-1905

from: SJ Munyard, 234 Harold Road, Hastings, TN35 5NG



The four members of the Flora Community: Clive Jermy proudly sporting the BPS logo in remotest Norway, Mary Gibby propping up the Flora sign and Johannes Vogel in charge of the hand lens next to the star of the picture: *Dryopteris affinis* (arrowed). [Photo J. Vogel]

PTERIDOLOGIST **INSTRUCTIONS** **TO AUTHORS**



Pteridologist welcomes contributions written in English on all aspects of the natural history and horticulture of ferns and related plants, as well as articles about ferns in literature, art, architecture, music, furniture, folklore etc.....

.....*in fact, anything fern-related.*

SCRIPT: *Ideally* text should be provided in the form of a file downloaded to a floppy disc from a PC type of computer (not Mac). I can use formatted material from most popular word-processors (eg. WORD, WORKS, WORDPERFECT, WORDSTAR, 1st WORD PLUS, WRITE). WP files should be accompanied by a raw text file in case I have any difficulties. Please check spelling, grammar, meaning and formatting with care because, when let loose with my editor's red pen, I am merciless.

Computerless authors need not fear, for I will accept type-script (double-spaced on one-side of the page). I'll even tackle spidery scrawl on tatty bits of twice-used fish & chip wrappers!

CONVENTIONS: Scientific names should be in italics (underlined in type-script or manuscript), the authority normal thus:

Polystichum setiferum Førskal

Polystichum setiferum Førskal

Polystichum setiferum Førskal

Variety names should be in normal type, capitalised and enclosed in inverted commas thus:

Polystichum setiferum "Plumoso-divisilobum"

Common names should be in lower case:

soft shield fern

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*So you can see there are really very few rules.
I look forward to receiving ferny articles in any form,
but you'll make me particularly happy if you send stuff on disc.*

PTERIDOLOGIST



Please send contributions to PTERIDOLOGIST 1995 (the sooner, the better) to:
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PTERIDOLOGIST

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THE
BRITISH
PTERIDOLOGICAL
SOCIETY

PTERIDOLOGIST

Edited by
JAMES MERRYWEATHER



THE BRITISH PTERIDOLOGICAL SOCIETY

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[Front cover: *Asplenium ceterach* L.]

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, from whom further details can be obtained.

JUN 27 1995

EDITORIAL

I trust you enjoyed my first effort as editor of this splendid publication, a compilation of pteriffic pteridological ptopics from a delightfully wide range of individuals. Ptypos were scarce, thanks to plentious proof reading which resulted in my almost memorising the whole journal! However, I do apologise to "the Pillips". Unfortunately Jack's scollie got itself inverted and *Asplenium flaccidum*, dramatically failing to live up to its name, is seen growing bolt upside-down. More importantly, near the bottom of the rear cover should have read:

Pteridologist Volume 2 part 4 was published on 20th May, 1993

Authors, please read page 299. For this edition I've had to do so much typing that I was pretty fed up by the time the actual editing had to be done. Nowadays, almost everyone has access to a computer, so I'm asking as many of you as possible to send text on disc. Even chronic arch-luddite Rickard has got the hang of it now. Still, I really want your literary efforts, so typing and spidery scrawl will still be welcome if all else fails.

Your new editor has had quite a lively year fern-wise. I had the great pleasure of teaching a couple of fern courses for the Field Studies Council at their Blencathra centre. What I did not reckon on was the presence of several BPS members who, despite being perfectly competent enough to run the courses themselves, allowed me to feel as if I was in charge.

The youngest of the bunch correctly interpreted a nice bit of woodland ecology on the limestone near Meathop (where we find masses of *Adiantum capillus-veneris* at its most northerly). The woods were, of course, full of calcicolous plants, but we encountered a single, unexpected plant of *Dryopteris dilatata*. It was delightful to listen as Matthew (12) reasoned that it was probably able to survive there because it was growing on a tree stump. We'll keep an eye on it to see if it fizzles out as its substrate becomes incorporated into the surrounding highly calcareous soil - irate land-owners permitting.

We are even more aware these days that field work can be hazardous, indeed the BPS is now obliged to ask members to sign indemnity forms before each meeting. On one of our visits to limestone pavement, where accidents can so easily happen, I lost touch with one of the party for longer than was reasonable. I was very worried, and scoured the area until the missing person turned up, apparently no worse for the experience. A less decent person could have made a lot of fuss about the fall and the broken ribs! That incident has given me a fright, and I urge all members to look after each other at field meetings, for anyone can get into difficulties.

The trickiest part of these courses was, as you might expect, that wretched *Dryopteris affinis* headache. We willingly learned a lot about those morphotypes but, at the same time, found ourselves wading into deeper and deeper water. We must be patient, hoping that soon we will have a reliable framework upon which we may more confidently hang our tentative identifications. I'll see what advances have been made, and perhaps next year *Pteridologist* will include a friendly new guide.

I have the good fortune to belong to two societies which call themselves the BPS. Last January I was attending to the usual clutch of membership subs., and dutifully sent cheques to both....well, I thought I did. After a while Alison sent back a spare cheque at the same time as I was being threatened with expulsion from the BagPipe Society of which I am (but nearly wasn't) a proud founder member! I bet I'll be confused again next year. I think I now have a standing order with one, but not with the other. Which will be which when I really need to know?

I'd like to slip in a plug for the second edition of *The Fern Guide* (editor's privilege). The first sold out rapidly - *hooray!* - and it became possible to correct and improve it before reprinting - *phew!* So, burn your copy and buy a new one right away. It beats me why the ardent bibliophile has a preference for first editions. If a second edition is justifiable, surely it's going to be an improvement on the first, replacing it? Either he doesn't care about the book's content or he wishes to gloat over the author's first, inferior attempt. But, stay awhile: should *The Fern Guide* #1 inexplicably become an object of desire to the investor-collector, I hope I get to hear about it so I can make a pile of dosh selling the few copies I have left unsold!

JAMES MERRYWEATHER

BPS MEMBER HONOURED

Congratulations to James Russell who, last July, became an honorary Doctor of the University of York. He has now retired to Fife in Scotland, but spent the latter part of his working life collecting plants from around the globe for, and creating the 130 acre arboretum at Castle Howard. Jim Russell, who spent his earlier career reorganising the famous Sunningdale Nursery, brought Hooker's Sikkim *Rhododendrons* with him to Yorkshire where their flowering in May is an annual pleasure. He was honoured for his contributions to botany and conservation.



SHORTER NOTE

*Matteuchia on the menu**

Gourmet pteridophages contemplating a feast of fiddleheads this year should take note of a recent article in *Morbidity and Mortality Weekly Report*, 1994, 43:677, 683-684. About sixty people in New York State and western Canada came down with diarrhoea, nausea and vomiting which was traced to fiddleheads (*Matteuccia struthiopteris*) served as starters in local restaurants during May.

It seems that attention to preparation is the key to a safe meal. The guilty restaurants had only lightly sautéed or briefly microwaved the croziers, in contrast with the recommended boiling for ten minutes prior to sautéing. A heat sensitive toxin is thought to be responsible. Fresh fiddleheads are apparently becoming more widely available at restaurants and markets in North America as more people experiment with seasonal wild food. The commonest recipe used is to sauté in butter with garlic, lemon, salt and pepper, according to taste.....but remember the ten minute boil.

MICHAEL GRANT

* See *Pteridologist* 1, 6 (1989) p. 267 & 2, 1 (1990) p. 8

FROM THE PRESIDENT

When, last autumn, I was elected as the new President it was mentioned that this would involve doing this, that or the other as part of the duties. However, what I was not told was that I was also expected to contribute a few paragraphs to *Pteridologist* so it came as rather a shock when I had a 'phone call from James Merryweather asking for these immediately (if not sooner). What I had forgotten when I promised to get my contribution into the post *instanter* was that we are locally in the throes of a postal strike, so that both incoming and outgoing mail are at a standstill. So I guess that short of carrier pigeon and not having a FAX, the answer is to set out to find a post box outside the affected area. It feels reminiscent of the chaotic scenes in TV plays set in newspaper offices as deadline approaches.

The landmark event of this year is the Pteridophyte Symposium called 'Pteridology in Perspective' to be held at the Royal Botanic Gardens, Kew (17-21st July) and followed by an excursion to Devon and Cornwall (23-30th July). A considerable amount of hard work is involved in setting up and running such an event which is attracting pteridologists from all over the world. Our society is deeply involved in this through our members who are on the organising committee and working hard on other aspects of the symposium. The event is also an opportunity for publicity for the society, and the outcome may be that we get closer to the ambition of our last President, Jack Bouckley, in achieving 1,000 BPS members by the beginning of the next century. The symposium was planned as a memorial to Eric Holttum who, during his long life (1895-1990), did so much to stimulate interest in ferns and their relationships with one another.

I first met Prof. Holttum over 40 years ago at the Paris International Botanical Congress. This was a landmark year in Pteridology in that his book on the ferns of Malaya had just been published, as had also the paper by Irene Manton and Arthur Sledge on the cytology and taxonomy of the ferns of Ceylon. Holttum saw the value of cytology in helping to unravel some of the difficult problems of relationships between fern genera, and there began a fruitful co-operation between Holttum and Manton which lasted for the rest of their lives. As one of Manton's research students interested primarily in tropical ferns, I had a great deal of contact with Holttum over the ensuing years, and one of the great pleasures was to present him with some fact which interested him, and to hear his delighted "Golly, golly, gosh" in appreciation. He was a man of great patience and gentleness with people who had a genuine interest in ferns, but this did not always extend to those whose views he felt were not based on sound work!

It was always an education to have a chat with 'The Prof' as he was affectionately called at Kew, but it was a great pity that all those chats were not taped. He had a vast fund of knowledge based on personal experience, and often his comments would start with some phrase such as: "I watched this plant for x number of years and it....." Despite having written several books and literally a few hundred research papers, a great store of information was never recorded, and died with him.

It is not always realised that Holttum was not only interested in ferns, but also was a world authority on orchids. Whilst Director of Singapore Botanic Garden, he did much pioneering work which not only benefitted orchid hobbyists, but also helped to establish orchid production as an important Singapore industry. He also wrote a very practical handbook 'Gardening in the lowlands of Malaya' and his 'Plant Life in Malaya', which was intended for local teachers and first year university students, is a constant joy to dip into.

I count myself very fortunate indeed to have worked with both Eric Holttum and Irene Manton.

Dr TREVOR WALKER

HIKING BOOTS AND FERN SPORE DISPERSAL

ADRIAN DYER, Royal Botanical Garden, Edinburgh.

Many species of fern in many habitats form a persistent soil spore bank - a reservoir of spores buried in the soil and remaining alive for at least a year, and probably for many years (Dyer & Lindsay, 1992). I thought of this as I was cleaning my hiking boots after returning from the Second International Fern Conference at Ann Arbor, Michigan, USA in July, 1990. The conference had been preceded by a week-long field trip, walking in the forests of north Michigan, looking at pteridophytes. Most of the forest is secondary regrowth after clearance for agriculture and timber, although one area, at Hartwick Pines State Park, Grayling, had escaped felling, even when Michigan provided most of the timber for the nation's railroads, and contained trees more than 300 years old. A variety of habitats yielded 68 species and 13 hybrids in all, including 14 species of moonwort and 16 clubmosses in some of the more recently disturbed habitats. Most of the sites visited were fairly wet and, inevitably, some mud stuck to the soles of my boots. It was still there when I came home. I scraped off this small quantity of soil and placed it over a layer of sand in a small petri dish. After moistening it with water, I sealed it with parafilm to retain moisture and placed it on a north-facing window sill. In about four weeks, gametophytes were visible on the surface and, after some months, some of these had produced sporelings. I transplanted these to compost in pots and eventually, after more than a year, several reached fertile maturity. It was then possible to identify them as *Dryopteris intermedia* (the "fancy fern") which resembles our native *D. dilatata* but has glandular and pleasantly aromatic fronds. These plants have now been growing for two years in the open in my garden.

A similar procedure after a holiday in Madeira in 1991 resulted in plants of *Adiantum raddianum*, now growing successfully indoors, and of *Athyrium filix-femina*. A visit to Gomera, an island off Tenerife, in 1993 has so far yielded plants of *Asplenium onopteris*. In each case, many other species were seen whilst walking, but either their spores were not represented in the mud which clung to my boots, or they did not survive to maturity when the soil was cultured. Species growing in drier habitats are, of course, less likely to be retrieved because the soil will not be picked up by boots. It is largely a matter of chance, therefore, which species can be obtained.

This is obviously a way of obtaining pteridological souvenirs of a holiday without disturbing or collecting the living plants, even when they are not shedding spores at the time. However, it also raises some serious issues. In the first place, the importation of soil as samples or on the roots of plants is strictly controlled and requires a permit and then a period of quarantine at a designated institution where the soil can be checked and cleared. It is, therefore, illegal to dig up a soil sample near a desired species and then bring it home to cultivate.

However, I cannot believe that I am the only one who fails to scrape and wash all the soil out of the patterned soles of walking shoes and boots before packing them for the return journey. There must be others who just put them in a polythene bag for cleaning at home, and the authorities must be aware of this. That being the case, many people must inadvertently bring spores of exotic ferns back to Britain in this way. Many holiday makers, and even some who go abroad on business, go on excursions into rural areas, and some go specifically to walk or study natural history. Given the number of people who travel abroad, this must create previously unsuspected possibilities for the introduction of alien species to Britain.

Subsequent use of their boots without first cleaning them could introduce foreign spores and seeds to almost any part of the countryside. Only temperate species are likely to establish, even temporarily, but there is a considerable number of hardy species in, for

example, New Zealand, Japan and China as well as other parts of Europe, which are likely to be able to survive in our climate. In the past, the rare appearance of foreign species in the wild has been attributed to escape from cultivation in gardens, or to long-distance dispersal of spores on the wind. Now we have to add the possibility that they are transported as soil spore banks on boots! This, in turn, suggests that they might also be carried in mud on the feet of birds. This has already been suggested for the large resistant sporocarps of the heterosporous fern *Pilularia* and the megaspores and microspores of *Isoetes* (Page, 1988), but it is now clear that it might apply equally to the single spores of the more numerous homosporous ferns or, at least, those of wetlands. This could provide a means of introduction of these species from countries visited by birds on their migration routes.

These observations lead to a further prediction that spores are also transported in the mud which adheres to vehicles. Again, despite controls over importation of soil, small quantities must enter the country from all parts of Europe, and even occasionally from farther afield, under the wheel arches of cars and lorries. Subsequently washed off when travelling on wet roads, these spores could get onto damp and shady roadside verges and hedgerows, perhaps mainly in the vicinity of continental ferry terminals, where the conditions might well be suitable for germination and development. I am not aware of any fern discoveries that could be attributed to this mode of spore dispersal, but most cases would involve species found in both Britain and continental Europe, so introduced plants could not be readily distinguished from native ones. Even in the absence of positive confirmation, the possibility of spore dispersal in mud on human or bird feet or on vehicles cannot be dismissed.

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SHORTER NOTE

Bulbils on fronds of Asplenium scolopendrium

It is well known that hart's tongue ferns readily produce bulbils on their leaf bases. However, bulbils on the frond surface are rare. They were occasionally reported during the last century, indeed E.J. Lowe chose to illustrate a crested form discovered by P.B. O'Kelly liberally covered with plantlets as the frontispiece of his invaluable book, *British Ferns* (1890). This plant has long been lost, but occasionally bulbils have been seen on varieties since. A few years ago Vic Newey showed me a 'Brachiato-cristatum' form with the odd bulbil on it. He even gave me a plant, but it has never since produced a single bulbil. At the time Vic thought that bulbils would only be produced while the plant was young, and so this has proved with my plant. Perhaps other members have seen bulbils on their plants. If so, has the bulbiferous character been restricted to young plants?

While in the process of moving all our ferns I have had to pot up many of my hart's tongues. Perhaps the move confused old plants because one plant, *Asplenium scolopendrium* 'Drummondiae', has produced several bulbils. Most are at the base of the frond where the lamina meets the stipe, but some are on the lamina itself. At the time of writing all bulbils are small, but I will certainly try to raise plants from these.

MARTIN RICKARD

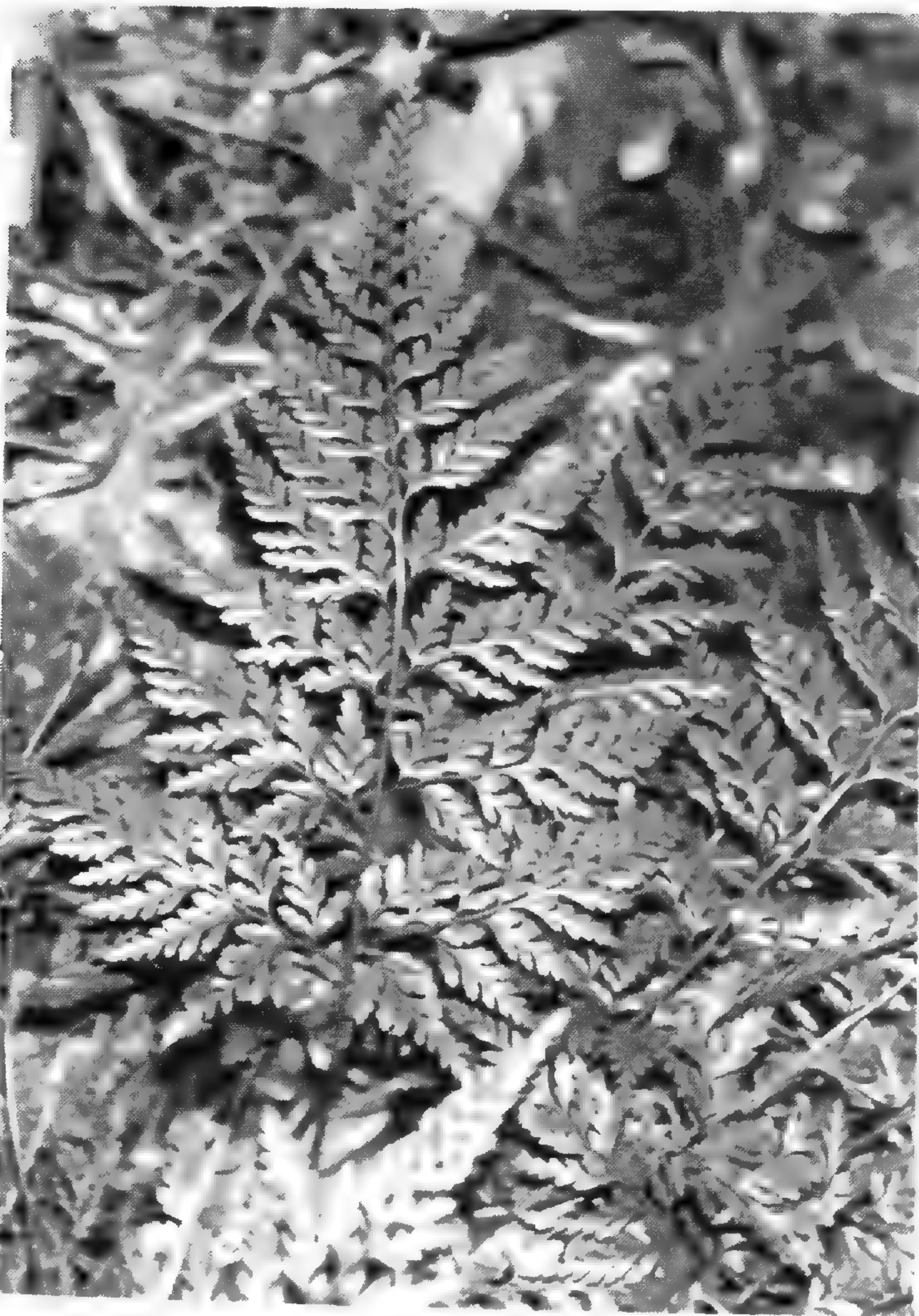
I will be pleased to collate any information about bulbils, no matter how brief, in the hope of producing a discussion of the phenomenon in a future issue - ed.

THE ERRANT ΒΟΤΑΝΟΛΟΓΟΣ* IN NORTH-EAST CORFU

JAMES MERRYWEATHER, *Biology Department, Po Box 373, University of York, YO1 5YW*

Refreshed, that's how Corfu looked in late October 1994. After a long, dry summer, the first rain had revived the shrivelled *Selaginella denticulata* and *Asplenium ceterach*, and zillions of tiny plantlets were sprouting from seed set during the high tourist season. The ground in the dappled coolness of the olive groves so sensitively described by Durrell (take your pick, Lawrence or Gerald) was carpeted with cyclamens, crocusses and minute narcissi - the understory was returning to life.

Banks of rich brown earth alongside the roads and tracks were covered with sheets of *Selaginella*, punctuated by the graceful laciness of *Asplenium onopteris*, turgid caerulean tufts of *Ceterach* or occasional loose, rangy *Asplenium trichomanes* ssp. *quadrivalens*.



Asplenium onopteris

Bare or mossy patches were often covered with forests of prothalli, each bearing just one, tiny fan-shaped leaf. For a while I assumed they belonged to *A. onopteris* which usually grew nearby. Then I suddenly realised that I recognised those little leaves, for I'd seen them at the bases of sporophytes I'd found elsewhere in Greece, but never noticed here before, because of my preference for cyclamen time. This was our Jersey fern, *Anogramma leptophylla*, which thrives in the warm south.

I'm so accustomed to the slow development of our native perennial ferns that I've always felt a particularly intrigued by a species which can get through its entire life cycle in a single year, especially in a region where its habitat is essentially arid for several months. However, in the shady coolness of the olive groves there are places where it remains just moist enough to permit gametophyte growth and, with the first rains in September, fertilisation takes place and the little

ferns develop rapidly. As ferns go, they attain size with speed and are pretty well *huge* by April. I've seen fronds up to 20 cm high sporulating like billy-o, quite an achievement after just six months of growth. The illustration in *The Fern Guide* is, I now confess, drawn from Cretan specimens (and the *A. onopteris* was a Corfiot).

Bracken in Corfu seems to have difficulty determining the seasons. In the UK there are clear-cut summer for photosynthesis and growth, and winter for dormancy or sub-terranean activity. Corfu has no frosts to kill off the fronds and, whereas some colonies, especially the monoculture acres which follow severe fires, flush together, in the olive groves the woodland bracken has new fronds, fully expanded ones and dead ones all together.

* *votanoloyos* or *votanologos* (botanist)

The olive grove bracken looks very much as it does when growing naturally in British woodland: sparse, spreading and low. Higher up in the limestone hills, it grows with an upright posture and appears to be growing in proper, high pH limestone soils. If British bracken is found on limestone, it invariably has its feet in a pocket of acidic peaty material. Over most of Corfu, bracken fronds occur scattered about under the olives which cover most of the land. In the shady gullies it is at its most "British", standing tall, erect and dense. However, where there has been a fire, and on abandoned agricultural terraces, the continuous sward, so familiar on British heathland, is seen....but the bracken is only a couple of feet high and, er, "different". Now that Chris Page is describing two British species of *Pteridium* it would not surprise me a bit if there are also distinct taxa to be found on Corfu.

In Greece the proper word for fern (which we pteridologists use today) is φτερη (fteri). Corfiots I've spoken to point to my tee-shirt logo and say that the local name is βραχλο (vrachlo). I'm still not quite sure whether βραχλο means fern or bracken. Our logo is, to the lay person, a bit like bracken and, even in foreign places, most people can't tell bracken from "fern"! Even so, I'm sure I can sense a similarity between the words βραχλο and bracken.....?

A good hunting place for the pteridologist in Greece is where a road bends sharply to round a stream bed (see *Pteridologist* 2, 4, (1993) 179-180). There is surface water here only in winter, and these gullies are of little use to the natives (except, unfortunately, for refuse disposal) and ancient trees grow over to create the sort of damp, undisturbed shade in which we love to hunt the fern. Here many species grow together as in the photograph (right). *Asplenium onopteris* is at its laciest and the fronds of *Polypodium australe*, of usual stature on dry rocks and walls all over the island, reaches nearly two feet in height.



A. ceterach, *A. onopteris*, *A. trichomanes*, *P. australe*, and *S. denticulata* with *Cyclamen neapolitanum*

Sometimes in hedge banks, where occasional *Polystichum setiferum* may be encountered, is *Dryopteris pallida*, usually rendered extra pallid by a coating of road dust! It is a close relative of our *D. submontana*, but larger, greener, broader and not quite as stiff-looking. It is seen at its best in the arid limestone mountains where huge colonies follow the lines of Greek grykes, accompanied by rusty-backs and *P. australe*.

I've never been to Corfu at any time of the year other than October, so I don't know if it has more or other spectacular pteridological attractions. In autumn the weather is decidedly unpredictable. Although a few days of scorching sunshine are very possible, a whole week of chilly rain is an equal possibility. For me it's the cyclamens, carpets of them in that very special shade provided by the millions of olives of Corfu. If you want truly ancient olive groves or myrtle shades try the nearby islands of Paxoi and Antipaxoi, and if you want orchids and oranges it has to be April in Crete where, if you have some energy for strenuous mountaineering, ferns are plentiful and diverse.

SHORTER NOTE

Outstanding successes at Chelsea Flower Show

It is very gratifying to hear that, at the 1994 Chelsea Flower Show, ferns really came into the foreground. Martin Rickard put on a stand of ferns which attracted a lot of attention, and the Oxford University Botanical Garden display also featured ferns. The latter was arranged under the leadership of the University Horti Praefectus, Timothy Walker. Both were awarded gold medals.

JACK BOUCKLEY

FERNS DON'T LIKE IT ACID

PETER HAINSWORTH, Station House, Achnashellach, Strathcarron, Ross-Shire, IV54 8YR.

My insatiable curiosity is often aroused by the sight of a *miffy* plant. In *my* book, plant or animal (or human) ill health has to have a reason. Things don't just happen. The chance of infection by a parasitic organism has to be faced, but even they don't usually make progress or we'd all be dead. These thoughts stem from reading Darwin's *Origin of Species* in my late teens (some time ago, now) and the blindingly obvious revelation that evolution, by competition, ruthlessly fine-tunes a species to its environment. If the species is not doing well it is the environment that is the problem.

Every year I raise a full complement of fern species offered by the spore exchange, plus a few more offered by well-wishers travelling abroad: "Bring me back a bit of fern with brown spots on the back". So, I am glad of some sort of early warning system of compost incompatibility.

In the early stages, the compost is equal parts of vegetable garden soil, garden compost, sand (rather alkaline) and chopped sphagnum ("Vapo" peat, very acid). I get the impression that plants in fresh compost are not much affected by pH, or it only begins to show after a few months. Perhaps the free availability of nutrients in the garden compost is the reason.

When plants show signs of distress I first consider the usual causes. Over or under watering is quickly terminal, as a rule. If short of food, successive fronds become progressively more yellow and the plant loses vigour.* Having eliminated those, I suspect unfavourable pH.

My BDH soil indicator fluid is always at hand, together with a few tiny 1 ml clear plastic bottles. In a few moments 0.5 ml of compost from between the roots is being shaken up with enough indicator to cover it well. As it settles the fluid on top begins to show the appropriate colour for the pH. This often shows a marked swing from the usual compost value of 7-6. It is seldom very clear why this happens, but I presume some variation occurs in the ingredients. This is where the users of standard composts have the edge on me, but even these composts don't always suit.

Most of us, perhaps, looking upon ferns as woodlanders growing in leafmould soil, expect to find that they would prefer rather acid conditions. Experience so far has shown that acid lovers are exceptional. The great majority succeed in composts where the pH is between 7 and 6.

Here is a list (opposite) of plants which, at one time, were doing poorly and, after checking the pH, were put in a compost of markedly different pH and recovered. I checked the new compost's pH after a month or two.

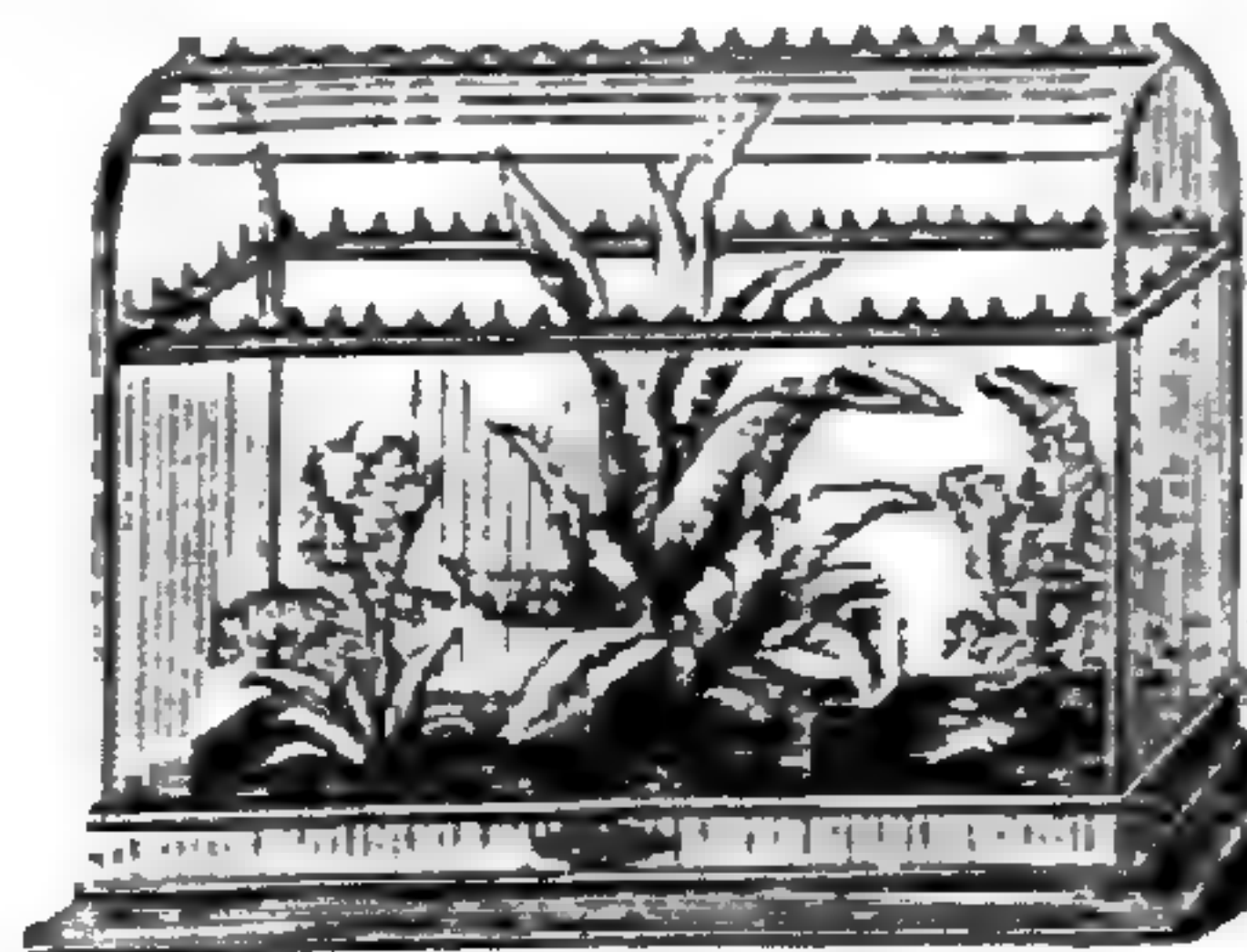
* see *Pteridologist* 2, 5 (1994) p. 194

SPECIES	pH
<i>Adiantum pedatum</i>	7.0
<i>A. reniforme</i>	6.0
<i>A. sylvaticum</i>	6.0
<i>Asplenium oblongifolium</i>	6.75
<i>Blechnum attenuatum</i>	5.5
<i>B. spicant</i>	5.5
<i>B. sp.</i> (ex Page, New New Caledonia)	5.5
<i>Coniogramma japonica</i>	6.0
<i>Dryopteris aemula</i>	6.5
<i>D. tokyensis</i>	5.5
<i>Davallia tasmanii</i>	5.75
<i>Dicksonia squarrosa</i>	6.0
<i>Gymnocarpium oyamense</i>	7.0
<i>Microlepis strigosa</i>	5.5
<i>M. platyphylla</i>	6.0
<i>Onychium japonicum</i>	7.5
<i>O. contiguum</i>	7.5
<i>Osmunda regalis</i>	5.5
<i>Paesia srabula</i>	7.0
<i>Polystichum monotis</i>	6.75
<i>P. neolobatum</i>	6.0
<i>P. rigens</i>	7.0
<i>P. squarrosum</i>	6.75
<i>P. stenophyllum</i>	7.0
<i>P. tsu-simense</i>	6.0
<i>P. venustum</i>	6.0
<i>Pteris vittata</i>	7.0
<i>Rumohra adiantiformis</i>	6.5

Take these as you find them. They are not intended to be authoritative, and it may well be that half a pH point difference either way would have given better results. I just hope that anyone struggling with one of these ferns might find a pH test provides the answer.

Testing for pH has become an expensive business these days and indicator fluid appears to have gone out of fashion. We now have to buy 5-tablet tests for about £3. The original pH soil indicator is still available from McQuilkin & Co., 21 Polmadie Avenue, Glasgow G5 0BB.

It will cost you nearly £17 (mostly VAT and carriage) but that still works out at 5p a shot instead of the 60p of tablets. It is, of course, useful in the rest of the garden anyway. As for those tiny bottles, a friendly chemist or lab. assistant might provide, or I could oblige with a few.



ENDNOTE - My ferns have occasionally shown white tips to the pinnae and pinnules, sometimes ceasing growth as well. The likely cause of this was the use of moss killer on the capillary mat on which they were standing. I have not seen it since I gave up the practice.

VARIATION IN DRYOPTERIS AEMULA

MARTIN RICKARD, Kyre Park, Tenbury Wells, Worcs., WR15 8RP and ALISON PAUL, Natural History Museum, Cromwell Road, London, SW7 5BD

Dryopteris aemula is one of our most attractive native ferns. On what Jimmy Dyce calls "Aemula Isle" (the Isle of Arran) it grows to perfection in the humid woodland which has developed along the cliffs of the raised beaches. The pale green crisped fronds, perhaps 30 inches long, are a stunning sight as they cascade over the rocks in this fern-rich habitat. Despite its preference for high humidity and shade in the wild, *D. aemula* is not difficult to cultivate, and does well in a shady border even in eastern England, although it only reaches 12 inches in height. In favoured western gardens, however, it can be grown closer to its wild perfection, as demonstrated in Joan Loraine's wonderful garden at Greencombe near Porlock in Somerset. Here Joan has planted a dozen or so clumps to form a crispy, dense ground cover between shrubs in a shady part of the garden.

Over the years very few varieties of *D. aemula* have been recorded. Early in the fern craze, during the 1850s, three minor variants were reported:

'Augustipinnulum' - secondary pinnules more confluent and lobes irregularly shortened.

'Interruptum' - depauperate.

'Ramosum' - each frond branched at the base.

Later, during the 1870s or 1880s two better forms were discovered:

'Capitatum' - crested and capitate.

'Cristatum' - prettily and thoroughly crested.

'Cristatum' was generally considered to be the best of the five finds. It was collected in North Devon by W. Gill, a nurseryman from Lynton. The original plant died, but a sporeling came up. Dr Jones secured a fertile frond which he sent to Charles Druery. From this, Druery raised several hundred progeny, all crested (see the illustration in *The Book of British Ferns* by C.T. Druery). These were distributed fairly widely. Unfortunately Dr Jones's sowing failed.

It is doubtful if any of these ferns are still in cultivation. Jimmy Dyce remembers seeing one plant of 'Cristatum' in the Savill Gardens in the 1960s, but that now seems to be gone. If anyone knows of the whereabouts of this cultivar today - or any of the others listed above - please let us know.

Although the original finds are probably all lost, *all* is not lost! Nature is an incredible resource. This year, while botanising for the Natural History Museum, one of us (A.M.P.) spotted a young plant of *D. aemula* 'Cristatum' growing in the wild in Ireland. The plant, which was in a precarious position by a track, was collected, potted up and seems to be doing well. From the illustration (left) it can be seen that the crests are quite large and indeed the largest frond is branched, suggesting that



'Ramo-cristatum' might be a good name for it. However, the plant is young, and it may settle down to being more lightly crested like the original North Devon find.

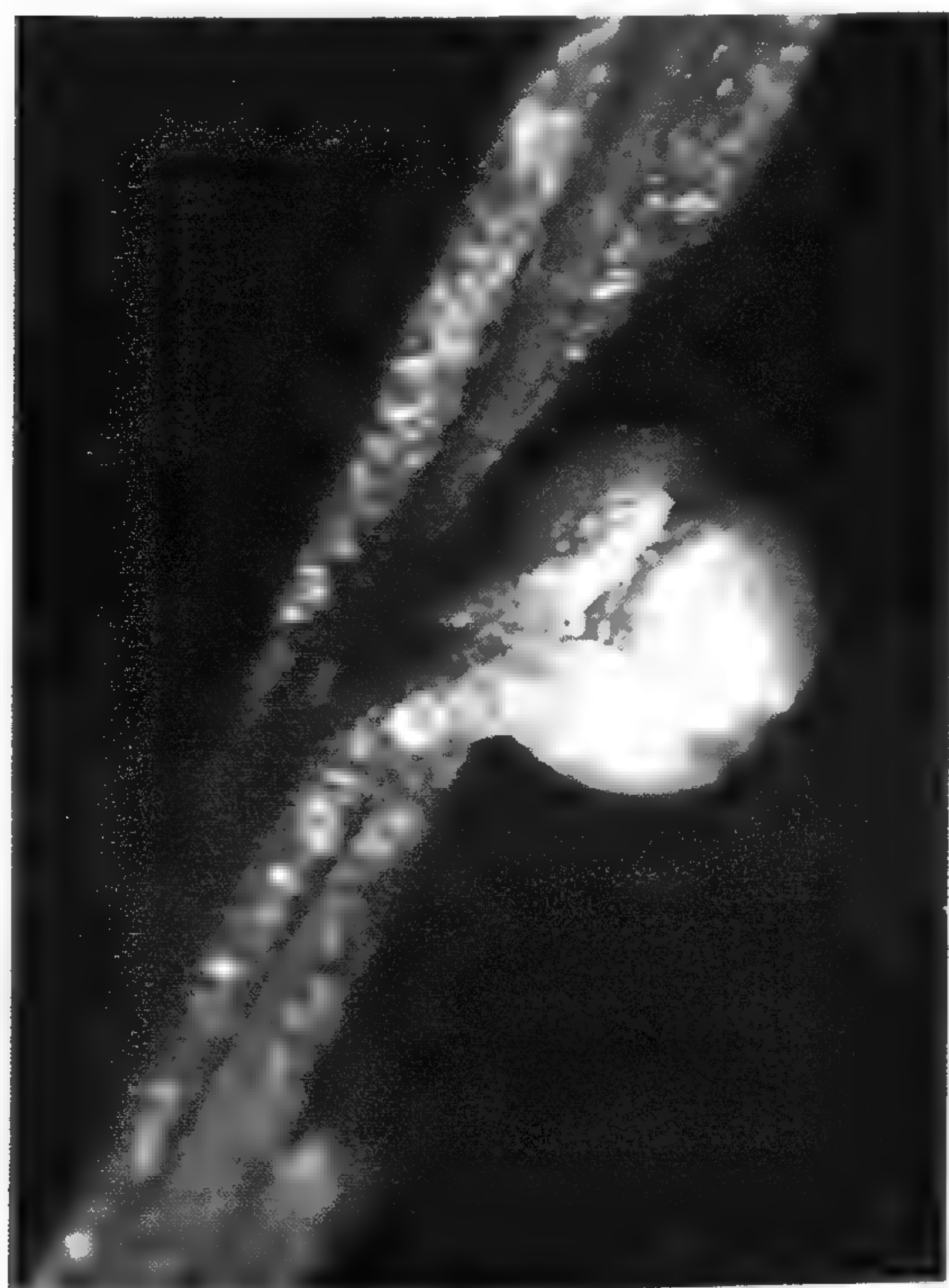
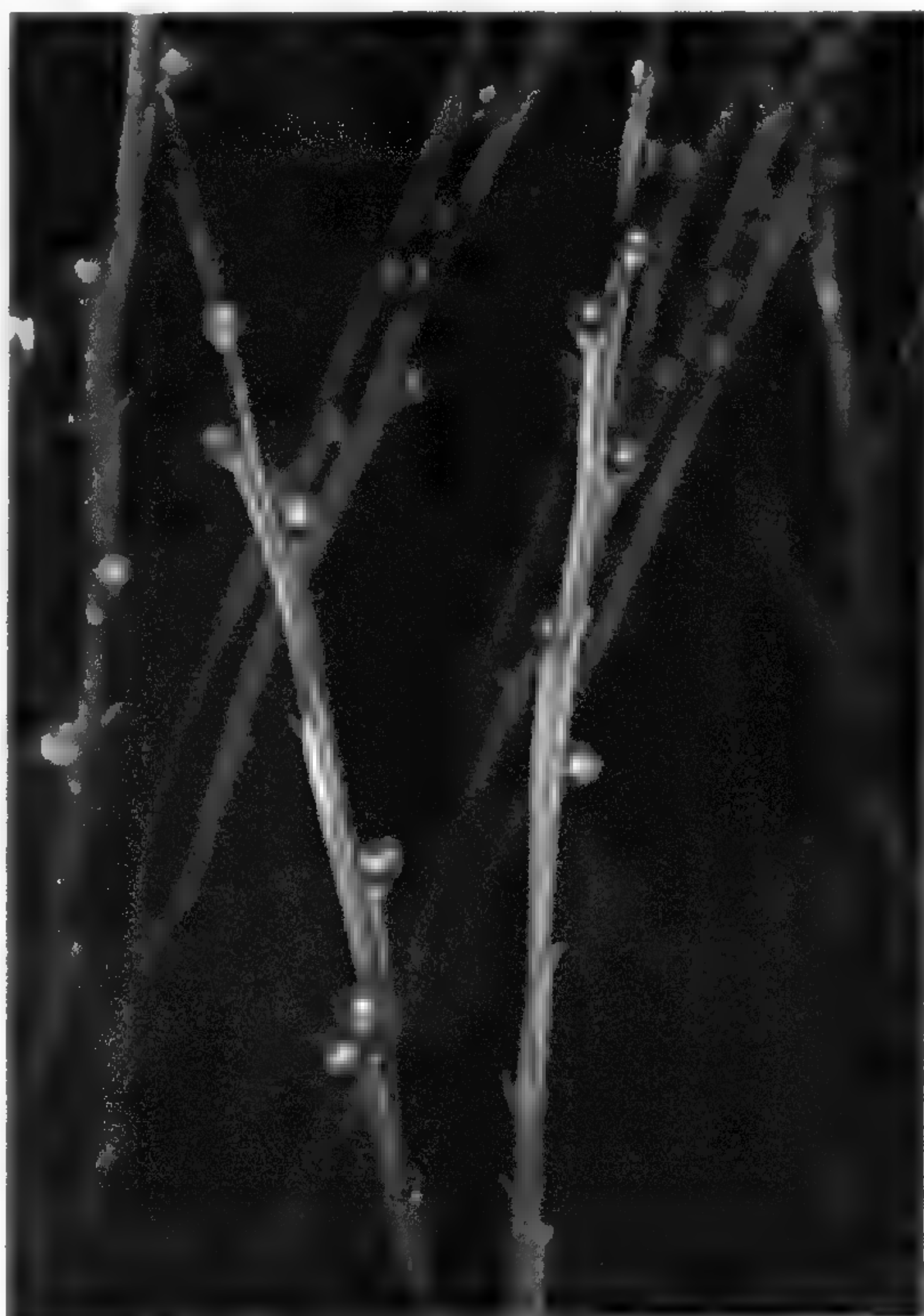
As yet there are no sporangia on the plant but, it is hoped that, in time, this fascinating new find will enable a variety of the *Dryopteris aemula* 'Cristatum' group once again to be widely distributed.

A PTERIDOLOGICAL PETER PAN

GAVIN STARK, 74 Silver Street, Peterborough PE2 9BX

Psilotum nudum (L.) Beauv is a most peculiar pteridophyte. In their classifications, taxonomists place this species in a different class - Psilotopsida - from that of any other European Pteridophyte. The presence of *Psilotum* in Europe passed unnoticed until January 1965 when Betty Molesworth Allen discovered a small colony growing on a sandstone cliff in SW Spain. It almost seems as though being overlooked is the vocation of this rather nondescript plant.

Readers of a purist fern ilk, those among our ranks who consider horsetails irritating weeds, and clubmosses as plants one sympathetically bends down to see on BPS outings in search of more frondy mountain species, will find the inclusion of this note in the *Pteridologist* hard to swallow. What is our editor thinking of?! (*Psilotum nudum* does not even appear on the Rickards' list!). In appearance *Psilotum* consists



of little more than forked stems. Closer examination of these stems reveals a scattering of minute flattened leaf-like appendages and occasional clusters of green to brown sacs (syngonia) borne closely appressed to the stem. In spite of its plain appearance *Psilotum* has long fired disagreement among those interested in the evolution of land plants. Debate began in 1859, when the appearance of *Psilotum* was likened to that of the then newly discovered fossils of early Devonian plants. On one side of the debate were those who regarded this similarity between the fossils and *Psilotum* as a coincidence resulting from simplification during evolution of a fern like predecessor, whilst on the other side were scientists who considered the likeness not one of chance, but a reflection of *Psilotum's* direct descent from plants of the kind represented in the Devonian fossils. Those arguing the latter case supposed *Psilotum* must have passed through generation after generation and hardly changed.

My first encounter with this plant was during a class practical at Reading University. A small fragment of rhizome, procured from a vigorously growing pot of Spanish *Psilotum* which we had been given to examine, failed to grow when transferred to my kitchen window. The fragment was too stiff to wither and remained there long enough to arouse my curiosity about the plant. If any reader can supply me with living material for a second attempt please get in touch!

The most vociferous debate has centred on interpretation of *Psilotum's* anatomy. Living *Psilotum* has a number of characters which appear 'primitive'; that is to say characters which are shared with the Devonian fossils. Such characters include, the simplicity of *Psilotum's* tissues, the nature of its sporangia (the clusters of brown sacs), the similarity of gametophyte and sporophyte tissue and that the gametophyte possesses vascular tissue. One could argue that these are primitive characters which *Psilotum* has retained or derived by simplification which *Psilotum* has obtained. This kind of debate is difficult to prove either way, particularly since no fossils of *Psilotum*-like plants have been found for the 374 million years between the start of the middle Devonian and the present day.

In Japan there is a long history of growing cultivars of *Psilotum* as an ornamental plant. In parallel to the Victorian fern craze and our rarer British *Woodsia* and *Trichomanes*, so the collection of *Psilotum* by Japanese growers (coupled with increasing urbanisation) has left few wild stations for *Psilotum* in Japan. A cultivar named 'Bunryo-zan' (it was collected from Mt Bunryo) has been in cultivation since the late eighteenth or early nineteenth century. This cultivar is unusual in lacking the small leaf-like appendages and in having all its synangia at the ends of branches. In suggesting that this manner of growth is latent in *Psilotum's* make-up, this cultivar places *Psilotum* just a few steps from early plants such as the fossil species *Renalia hueberi*. (Illustrations may be seen in Stewart & Rothwell, 1993).

Recent studies (Hori *et al*, 1985) employing chromosome counts, phytochemistry and molecular studies have not altered this conclusion that *Psilotum* is "the oldest and simplest vascular plant".

Peter Pan never grew up. It is quite plausible that *Psilotum* in a similar way has passed through generation after generation and remains scarcely changed from the first land plants. I like to think so.

FURTHER READING & REFERENCES

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- Hori, H. *et al* (1985).** Evolution of green plants as deduced from 5s rRNA sequences. *Proc. Natl. Acad. Sci.* 82:820-823.
- Molesworth Allen, B. (1966).** *Psilotum nudum* in Europe. *Fern Gazette* 9(7): 249-250.
- Rouffa, A.S. (1978).** On phenotypic expression, morphogenetic pattern and synangium evolution in *Psilotum*. *American Journal of Botany* 65(6):692-713.
- Stewart, W.N. and Rothwell, G.W. (1993).** *Paleobotany and the evolution of plants* 2nd edition. Cambridge University Press.

I must take on my shoulders some of the responsibility for the appearance of this article, for it was I who bullied Gavin into researching and writing it. To present any aspects of the discussion of the nature of *Psilotum* is to skate on rather thin ice, but I think it is worth bringing to the attention of the readers of *Pteridologist*. Those of us who are honest will admit that we would be delighted if *Psilotum* could be confidently assigned to a group of plants once thought to be long extinct, and Hori *et al* have provided some excellent preliminary evidence. I have conducted a cursory literature search and can find little to suggest that anyone has yet addressed the question by chopping up this fascinating plant's DNA and comparing relevant fragments with those of other pteridophytes (I'd appreciate being corrected). Once that is done, the story should be good enough to stimulate Steven Spielberg into making the follow-up to *Jurassic Park*, perhaps entitled *Devonian Bot Garden*? I'd certainly go to see it - Ed.

BOOK REVIEWS

FLORA OF GALMORGAN by A.E. Wade, Q.O.N. Kay and R.G. Ellis, HMSO London, 1994. Pp. viii, 393, 170 x 245 mm, 42 col. illustrations (on 9 plates), 20 b & w figures including several maps. Paperback price £29.95. ISBN 0 11 310046 9.

At long last Glamorgan has a much needed, up-to-date county flora. Out of print works *Flora of Cardiff* by Storrie (1886), *Flora of Glamorgan* by Riddelsdell (1907) and *Flora of Glamorgan* by Trow (1911) covered much of the flora of the county but are long out of date and, in the case of the two newer works, just about impossible to find second-hand.

Glamorgan is a ferny county of greater than average interest and has not escaped the interest of the BPS. Not long ago, George Hutchinson, one of the major contributors to this work, organised a BPS weekend meeting in the county which hopefully helped fill in a few dots on some of the distribution maps. Currently 48 different pteridophyte species are recorded, plus quite a few hybrids and subspecies. The distribution of each taxon is given on a 5 km square basis. Only commoner species are mapped, the individual squares for rarer species are listed in the text. Two ferns, *Ophioglossum vulgatum* and *Osmunda regalis*, are illustrated in colour.

Introductory chapters give accounts of the history of botany, botanists, ecology and plant distribution in the county. Geology is particularly well covered, not surprising, considering the richness of the fossil flora of the carboniferous coal measures. Some fern and fern ally fossils are illustrated.

The first reliable record for any plant for Glamorgan was *Polypodium australe* 'Cambricum'. How nice to see a fern coming first as it should! Even more remarkable to think that it still grows in the original site where it was recorded by Richard Kayse of Bristol in 1668.

It is good to know that nationally uncommon *Adiantum capillus-veneris* still abounds along the Glamorgan coast. However, *Thelypteris palustris* and *Pilularia globulifera* have gone as too, it seems, has *Dryopteris aemula*. The absence of the last is the more remarkable as *Hymenophyllum tunbrigense* still occurs at three sites within the county. A challenge there for the BPS?

Towards the end of the book there are sections on liverworts, mosses and lichens, and a marvellous gazetteer of the county. The list of references running to 34 pages and the index of 54 pages are final proof of the thoroughness of this book.

Technically excellent as this book is, it seems rather expensive for a paperback and, not surprisingly, it will not stay open at a given page. My review copy is beginning to come unstuck already, and I am forced to wonder if the book will survive in the field. Nevertheless, it is essential reading for anyone interested in the flora of south Wales, and the authors are to be congratulated for compiling an extremely comprehensive account of the flora of Glamorgan.

FERNS FOR AMERICAN GARDENS by John Mickel. Macmillan, New York. Pp. xii, 370. Numerous line drawings and more than 360 colour photographs 1994. ISBN 0 02 584491 1.

Here is a book which provides the American fern grower, new or experienced, with all he or she needs to know. Remarkably, this book is by a botanist of high standing, and much of John Mickel's output has been of the academic sort, but he has the facility for

communication with all audiences and has frequently contributed to the popular press. When I was *over there* a couple of years ago it was one of his books which guided me through the North American fern flora.

Ferns for American Gardens provides a painless lesson in pteridology, carefully designed and written in a way which any horticulturalist will enjoy. There are sections on fern structure and development, planting and care, plants to grow with ferns, nomenclature and a guide to fern societies and suppliers.

He describes so many species and varieties that I'll leave it to those who have the will to count them. Each is described, most with an excellent colour photograph and information about it in the wild, and then he gives that essential information about hardiness and ease of cultivation.

You've got so much easily absorbed information here that really, all you need to do is enjoy browsing through the book, deciding which ferns you want to grow, and where and how you want to grow them. Then, if you can find the supplier, growing them should be a doddle.

There are some trivial errors, but editors-authors understand that they are inevitable, and I will not list them here. I know that Martin Rickard has dug them out and the author will, no doubt, be grateful to hear about them. Readers in Britain should not be put off by the American Gardens label. Many of the ferns discussed by John Mickel are available here, and his guide to hardiness will be very useful to all growers. Since he lives in New York his choice tends to cover ferns for our sort of climate anyway.

The cover boldly calls this excellent book "The Definitive Guide" and, though no book can be absolutely all-embracing, I'm dashed if I can see any good reason to disagree. This is the first edition, and highly collectable, so collect it now!

AN ILLUSTRATED FERN FLORA OF WEST HIMALAYA - VOLUME 1 by S P Khullar with some contributions from CR Fraser-Jenkins. International Book Distributors, 9/3 Rajpur Road, Dehra Dun, India. 1994. Pp. xl, 506, 3 maps, 168 figs. 187 x 248 mm. ISBN 81 7089 136 1. Price hardback £50.

The west Himalaya area covered here is all the Himalayan provinces in India west of the Nepalese border with a slight extension into Pakistan. The area is very similar to that covered by Dhir in *Ferns of North-Western Himalayas* (1980) but the number of species described is increased, and the nomenclature brought up to date. The Christopher Fraser-Jenkins input is apparent here. He has added helpful notes after some species and contributed a large number of the localities.

Full keys are given. Synonymy of each genus and species is followed by a full description with key characters highlighted. Where necessary a discussion of any point of interest is added. Under each species a brief account of the habitat is given, plus a full range of localities. This section will be of great interest to growers as a help with cultivation. In many cases altitude ranges are given, which should be a useful guide to hardiness.

The coverage of each species is comprehensive, with critical species discussed at length. This is not a book produced by one man in isolation. I particularly like the way the author has freely consulted fern experts worldwide, making the book vastly more authoritative than it might otherwise have been. The coverage of the genera *Asplenium* and *Cheilanthes* are good cases in point here.

The illustrations are usually line drawings, but some are photocopies of herbarium material. The line drawings are supplemented by close-ups of diagnostic features. The main illustration is usually more or less natural size, but no scale is given for the magnified features. All, bar 15 taxa, are illustrated. I expect the drawings to be of immense value to students of the ferns of this area.

Volume 1 reviewed here treats 28 families and 182 taxa (species, hybrids and varieties). Perhaps the most important families included are Polypodiaceae, Sinopteridaceae and Aspleniaceae. Volume 2 will complete the work, covering a further 13 families including the very large groups Athyriaceae, Thelypteridaceae and Dryopteridaceae.

The price of £50 is rather high but not unfair in the light of other comparable fern floras produced recently. I trust the price will not deter too many purchasers. I, for one, hope we do not have to wait too long for the second volume of this excellent work, especially as it will include so many of the hardy fern taxa familiar to gardeners in cold temperate areas.

MARTIN RICKARD

Since writing the above I have seen this book for sale at £40. BPS booksales may therefore be worth trying for a competitive price.

Also, Christopher Fraser-Jenkins has pointed out inaccuracies in three of the figures of *Cheilanthes*:

1. *C. dalhousiae* (p. 198) has been drawn with the lamina of *C. bicolor* and the stipe scales of *C. dalhousiae*.
 2. *C. bicolor* (p. 191) has been drawn with the lamina of *C. dalhousiae* and the stipe scales of *C. bicolor*.
 3. *C. anceps* (p. 189) should not have scales along the rachis, but only on the stipe.
- The text is correct in each case.

HONG KONG FERNS by Dr M L So. Published by the Urban Council, in the Hong Kong Flora and Fauna Series. Pp 159, about 300 coloured photographs and over 100 scanning electron micrographs of spores. 151 x 215 mm, laminated cover. Price 90 Hong Kong dollars (about £7.50).

A relatively small area heavily built up, such as Hong Kong, would not seem to have the potential to generate an interesting book on ferns. Yet this book comes out only 16 years after the very comprehensive, technical account prepared by H. Edie, *Ferns of Hong Kong* (1978). The fern flora is therefore very rich and Dr So's book, set at a popular level, scores by having a wonderful range of colour photographs of each of the ferns covered. Something like 140 ferns are illustrated, usually with a habitat shot, sorus close up and a scanning electron micrograph of the spores. Edie's work was in black and white and included 175 species of fern so in an ideal world both books would be used in tandem.

There is at least one error. The illustration of *Thelypteris palustris* is something quite different, possibly *Stegnogramma*? Easily spotted errors such as this always unsettle my confidence in a book, but assuming this is an isolated problem, I feel I can recommend this book to anyone interested in the ferns of south east Asia. It is worth buying for the photographs.

MARTIN RICKARD

YET ANOTHER USE FOR BRACKEN

ADRIAN DYER, *Royal Botanical Garden, Edinburgh.*

Bracken, in its vigorous forms, is common in many parts of the world and, where it spreads aggressively to form dense stands, it is well known as a troublesome weed of upland grazing land, poisonous to domestic cattle and a haven for ticks. It has, however, also many uses (Rymer, 1976) and records of bracken being harvested and sold for one or another purpose date back to the 15th century.* There are references in the literature to its importance as a source of potash for soap and glass, and to its use as fuel (especially in brick kilns), as thatch, animal litter, floor covering and compost. It has also been used as animal fodder, human food (both as starch from the rhizome and as a green vegetable) and as an anthelmintic (a cure for gut parasites). There are records of its use as a hop substitute in beer, as an insect deterrent, a source of dye and as a packing material for storing fruit. It is difficult to imagine that bracken could have been put to any use not yet described, but a chance observation on a holiday in November, 1991 revealed one.

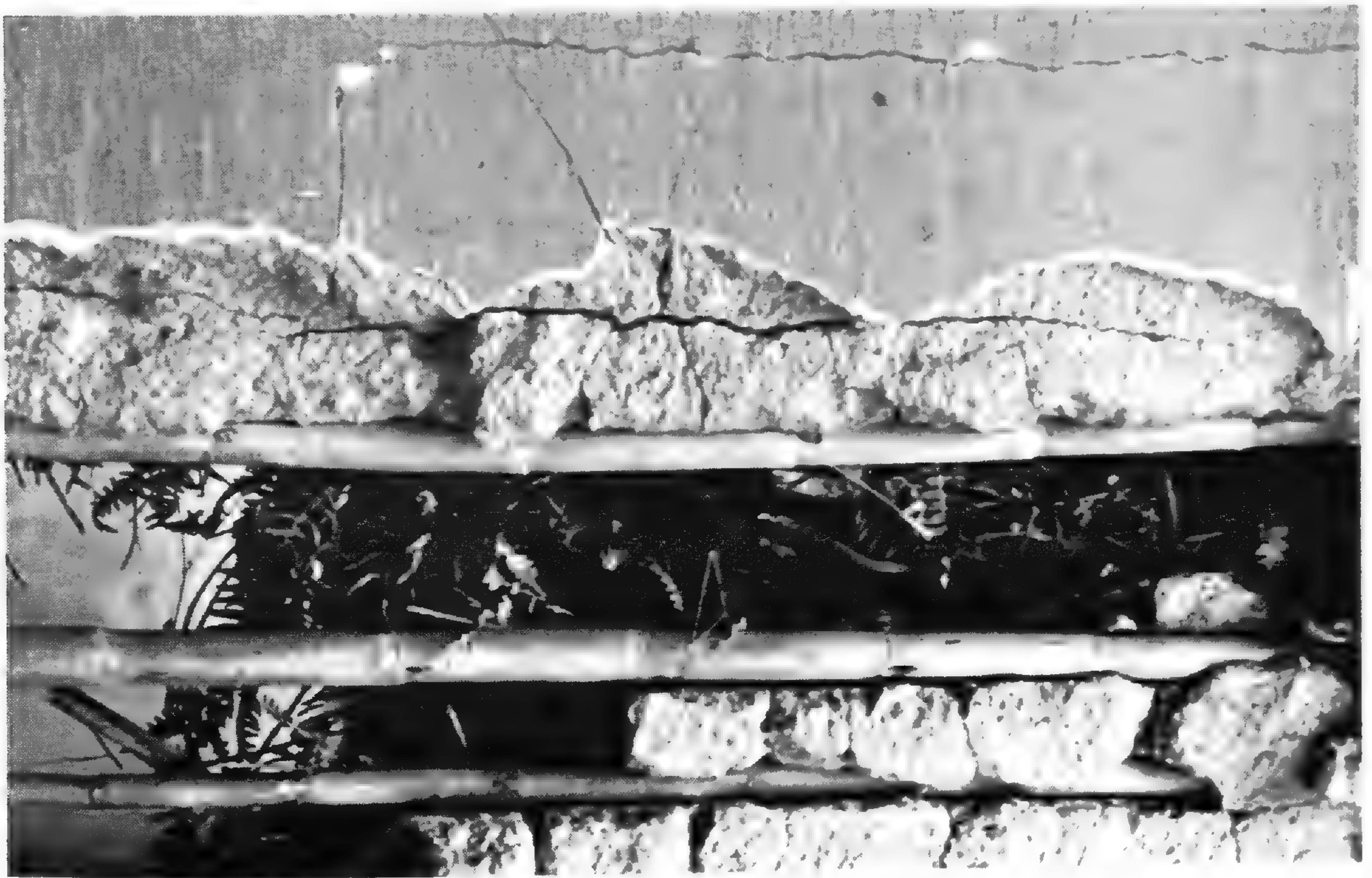
While spending a week on the island of Porto Santo, 50 km north-east of Madeira, I entered an abandoned one-storey, tile-roofed farmhouse near the small village of Campo de Baixo towards the west end of the island (below). The house contained two separate-roomed dwellings. It has not been possible to date its construction, but it is of traditional style, unlike the holiday homes spreading all around it. It was abandoned comparatively recently. There were broken pieces of furniture and domestic utensils inside, and the stones marking the rim of the circular threshing floor are still in place beside the farm house (below). Yoked pairs of oxen, sometimes accompanied by a donkey, were driven around within the circle to thresh the grain, mainly barley, which was grown, until recently, in adjacent fields. All the island's windmills are now disused, but a few still have their furled canvas sails confirming that their inactivity, and the abandonment of cereal growing, were recent.



The abandoned farmhouse near Campo de Baixo

* See page 256

Inside the farmhouse, an integral wall separating the two rooms of one dwelling was disintegrating to reveal its internal structure (below). It consisted of a framework of canes attached horizontally each side of stout vertical posts. The canes were probably of the giant reed, *Arundo donax*, which grows on Madeira. Two of the posts formed the frame of a doorway. On each side of the wall, the outer surface was covered with a layer of smooth plaster which was then painted (pink). Beneath this, rough plaster had been spread over and between the canes. Between the two layers of canes and plaster was a central cavity tightly crammed with bracken (below) which had apparently been harvested as dry, brown fronds at the end of their growing season and placed within the wall before it was plastered. The purpose of this might at first sight appear to be insulation but, because the climate of Porto Santo is equable, rarely hotter than 25°C or colder than 10°C, heat insulation in an inside wall is unlikely to be necessary. Another possibility is that the bracken provided sound insulation between the two rooms but, because the wall included an inter-communicating door, much of the benefit would have been lost. An alternative and more likely explanation, suggested to me by Stuart Lindsay, is that the bracken was packed into the wall in order to hold the wet plaster in place as it set, in the same way as wooden laths are used in Britain.



Internal structure of the disintegrating wall

It was not possible to discover whether this use for bracken was widespread on the island. The only published record I can find for the use of bracken in Macaronesia is a source of flour for human consumption in the Canaries (Lindley, 1838). Bracken itself is not common in Porto Santo. The island is made largely of limestone and arid, lacking the high central mountains that cause the rain on Madeira. I saw no bracken in the vicinity of the farm; the only population I found (*Pteridium aquilinum* ssp. *aquilinum*) occupied a small area on a dry, south-facing hillside about 2 km away in the centre of the island beside the chapel of Nossa Senhora da Graça. Perhaps this population was sufficient to provide all the island's construction needs before the tourist building expansion. Alternatively, bracken may have been previously more widespread. Either way, it would appear that bracken was used for this purpose in preference to barley straw which was

likely to have been much more readily available locally. Perhaps the many secondary compounds in bracken protect it against fungal attack and deter insects, making it more durable and hygienic than straw.

If bracken was not available in sufficient quantity on Porto Santo, it could have been harvested and imported from Madeira, perhaps together with the canes. Bracken is locally abundant on Madeira, particularly in the cooler, wetter mountain area inland. Near Santo da Serra in the east, it contributes noticeably to a landscape reminiscent of Perthshire, complete with pine trees, sheep, grassland and dry-stone walls. Bracken is also common in the moorlands of the Paúl da Serra in the west.

It may be that the tradition of using bracken as a filling for cavity walls started in these cool, bracken-rich areas of the mountains of Madeira and later spread to Porto Santo and elsewhere. In the mountains of Madeira, the increase in heat insulation might have been an additional advantage, even if the subsequent use of the practice on Porto Santo was of little benefit in this regard. A discovery of bracken within cavity walls made of wood or stone rather than plaster would suggest that insulating properties were important. It would be interesting to know whether there is any record of bracken having been used similarly in Scotland, Wales or anywhere else where there would have been a similar resource.

Alternatively, this use of bracken might be absent from Madeira. If it was particularly associated with the construction of walls made entirely from plaster and cane, it might be uncommon in Madeira where lime is less available than in Porto Santo. The inclusion of bracken in hollow plaster walls in other parts of the world where lime-rich areas coincide with a source of the fern would reinforce the suggestion that the main purpose of the bracken filling was to support the wet plaster.

My next visit to Madeira will have to include a tour of derelict houses. In the meantime, I would be very interested to hear from any members who have information that would throw further light on this use of bracken.

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SHORTER NOTE

The Fernery at Danesbury

Welwyn Hatfield Council owns part of the old Danesbury estate at Welwyn, Hertfordshire. They recently discovered, under the brambles and nettles, the outdoor fernery, originally built in the 1860s. The pulhamite structure is mostly complete, though nothing remains of the plantings. They are very keen to restore it to its former glory. I have agreed to help them in any way I can and to co-ordinate any advice or assistance that might be available from the B.P.S.

The Head Gardener at Danesbury from 1851 until he died in 1881 was Anthony Parsons, a well-known gardener and plant breeder of his time. He had a particular interest in Ferns, developing a number of cultivars including *Athyrium filix-femina* 'Plumosum elegans' Parsons, that was the parent of *A. filix-femina* 'Plumosum superbum' and, subsequently, *A. filix-femina* 'Plumosum' Druery. The fernery obviously had a large collection of fine forms in its heyday, as evidenced by contemporary accounts. It was described in William Robinson's *The Flower Garden* as the finest fernery in the Home Counties.

The undergrowth has been cleared and work is now starting to restore the rockwork where it has broken or fallen, to mark the pathways and generally to reveal the original hard structure of the fernery. After that, the question of further restoration and planting can be considered.

Welwyn Hatfield Council have the offer of some financial support from the Hertfordshire Gardens Trust, and seem genuinely keen to make the restoration a reality, talking of possibly building a National Collection there.

I believe this is an exciting project that the Society should encourage and help as much as we can. I would be very interested to hear from anyone who has information about Danesbury and its fernery, so that we can build as good a picture of its original state as possible. (*Address in front cover*).

ANTHONY PIGGOTT

MARSILEA POISONING IN 19TH CENTURY AUSTRALIA

MICHAEL GRANT, 3 Greenhill Road, Moseley, Birmingham B13 9SR.

A recent report in *Nature* (368:683-684) by J.W. Earl and B.V. McCleary has shed a pteridological light on the gruesome fate of the Burke and Wills expedition to traverse the then unknown interior of Australia. Setting out from Melbourne in 1860 with the aim of documenting flora and fauna and taking geophysical measurements, the expedition turned into a race to cross the continent before another team led by John Stewart.

On arriving at Cooper's Creek Burke, a police inspector, split the group taking one scientist, Wills and two others, King and Gray. This four man team reached the Gulf of Carpentaria on the north coast successfully, but their return was delayed by monsoons and the remainder of the expedition was found to have deserted the Creek.

The four were by now running low on grain flour and began to eat the Aboriginal flour made from the ground sporocarps of *Marsilea drummondii*, the nardoo fern. The specialised preparation of this flour had been demonstrated to them by Aborigines but this advice was forsaken in favour of grinding and cooking, their greatest mistake. The four began suffering from hypothermia, weakening of pulse and severe muscle wasting leading to an inability to move. Wills's detailed diary of their decline revealed the classic symptoms of beri-beri, now known to be caused by a deficiency of vitamin B1. He was aware that they were suffering from nutrient deficiencies, indeed he had recommended that they eat *Portulaca oleracea*, common purslane, to prevent scurvy. However, vitamins were unheard of until 50 years later when Funk put forward his theory of four separate 'vitamines' in 1912. Burke, Wills and Gray died at the Creek while King, with failing strength, continued to pound the sporocarps into flour. He was then cared for by Aborigines until eventually rescued, but remained crippled for the rest of his life.

It is now known that their beri-beri was severely exacerbated by the nardoo diet. The bean-like sporocarps contain two or three times more thiaminase than bracken fronds. Thiaminase is an enzyme that breaks down vitamin B1 and causes staggers in horses and a similar disease in sheep that feed on nardoo. The clover-like fronds contain a hundred times more thiaminase than bracken!

The sporocarp of the nardoo fern is extremely resistant to heat: the spores will apparently germinate after fifteen minutes of boiling, and the thiaminase, unusually for an enzyme, will survive cooking. The Aborigines avoid its toxic effects by grinding it in plenty of water to dilute not only the enzyme but also co-substrates (adenine, proline and hydroxyproline) which the enzyme requires to break down vitamin B1. Contamination by amino acids from other organic sources is prevented by avoiding contact with bark or leaf

utensils. The thin paste is spooned straight into the mouth with a mussel shell.

This is a good example of a traditional food processing practice rendering an otherwise poisonous plant palatable in a harsh environment. With our biochemical understanding we can only marvel at how the Aborigines developed their detoxification process.

SHORTER NOTE

....and yet another use for bracken?

There is a pretty French folk tune of the later 15th century (the original title and text are unknown) which was taken by a number of composers as a basis for their more artistic chansons. The most famous is the six-part *Petite Camusette* by the great Flemish composer Josquin des Prèz (c. 1440-1521).

However, the ubiquitous Anon. made a four part chanson out of it, and that he called *Allez à la Fougère*. In the text the poet invites a pretty brunette to join him among the rushes (*jolie jonc*) and *fougères* for unspecified, yet undoubted pleasures. In the modern edition from which the tune below has been liberated the title was translated as, I contend erroneously, 'Lets to the Heath'. We all know that *fougères* are ferns, perhaps in this case bracken (one of its numerous taxa) which, if you can avoid the ticks, makes a good place for two people to vanish for a while for a little *al fresco* privacy. The arrangement here is for a pair of bagpipes (ie. two), and is lifted from *Merryweather's Tunes for the English Bagpipe* (1989) wherein it is dedicated to Bob Stolze, pteridologist and medieval music enthusiast (see page 267).

JAMES MERRYWEATHER

Allez à la fougère

EXHIBITING FERNS IN COMPETITIVE CLASSES

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When considering whether to exhibit ferns the choice is made easier if we have plenty of ferns to choose from. It also ensures that we have substitutes in case anything happens to our prize exhibits. It's amazing how clumsy we become or how inanimate objects conspire to damage or destroy our plants, especially when after a long journey we are within sight of the show bench. It's difficult to suggest a optimum number, but if you wish to exhibit one lady fern it's as well to grow four in the hope that at least two will be suitable.

Only one major show provides the opportunity to exhibit ferns in several classes, and that is Southport. Most local shows may have a class for one pot fern and a class for one foliage plant. The following comments are made with Southport Show in mind, but the principles apply to any show. Having said that, do remember that in spite of my comments here, if your particular show rules demand something different, abide by them.

Showing from the exhibitors point of view.

The first task is to obtain a copy of the show schedule and please read it carefully and, when you feel that you completely understand what is required, read it again!

If it's simply a class for one pot fern that is quite straightforward and you can exhibit either a hardy or indoor fern. Sometimes a schedule will require that the fern is exhibited in a suitable container. Here they are emphasising the use of a plant pot. A plant in a washing-up bowl or a bucket is likely to be disqualified. However, a *Nephrolepis* in a hanging basket should be acceptable. Presenting a hanging basket on the show bench in a attractive manner can be something of a problem. Better not to attempt to hang it from something but sit it upon a terracotta pan or pot. If you can disguise the supporting pan with a piece of black cloth so much the better. More about this when we consider presentation.

In some shows they provide a class for three or more pot ferns and this presents more difficulties for the exhibitor, and at Southport the pitfalls are even greater because it provides classes for varieties of named genera. Do make sure that you recognise the different genera. I am always pleased to assist and advise on this before the show's staging day. Better this than an inquest after the show.

If the class demands three or more pot ferns, you must try to exhibit three or more plants of equal quality. Two superb examples are not going to upgrade a *miffy* third exhibit and the entry will lose points. Rarity guarantees nothing, a well grown and well presented male fern will always beat a poorly grown rarity. Needless to say, a well grown difficult rarity, well presented, will run off with the prize.

It is not within the scope of this article to discuss the details of how ferns might be cultivated for the show bench. However, it is worth mentioning that it was considered unacceptable to exhibit some species as multi-crowned ferns in large pots. Obviously something like *Gymnocarpium dryopteris*, *Polypodium vulgare* or *Phegopteris connectilis* are by their very nature creeping, multi-crowned species, but in days past it was considered bad form to exhibit such species as *Dryopteris filix-mas*, *Polystichum setiferum* or *Athyrium filix-femina* as multi-crowned plants. Exhibiting them as single crowned plants enabled them to display their distinct forms to advantage. It also provided a greater challenge to the grower to produce the perfect specimen handicapped by a limited number of fronds. A lot of sins can be disguised within a large pot crammed with fronds. Even today the judges are likely to favour a well grown, single-crowned plant.

Some exhibitors seem to have difficulty understanding the term **variety**. They sometimes think it means type and consequently stage their entry incorrectly. **Three *Athyrium***

means three distinct varieties: eg. *Athyrium filix-femina* 'Frizelliae', *A.f.f.* 'Cristata' and *A. nipponicum* 'Pictum' would be quite acceptable. However *Athyrium nipponicum* would not be correct because it is a species not a variety. Another incorrect entry would be *Athyrium filix-femina*, *A. otophorum* and *A. distentifolium* because they are species not varieties. A schedule will never ask for **types** of fern, they will always state **species** or **varieties**. Notice that it stipulates **three DISTINCT varieties**. Three different 'Grandiceps' are unlikely to be acceptable.

Having decided that we are competent to decide which are species and varieties, we now must consider our ferns geography. Some classes may ask for **three BRITISH ferns**. This is easy enough if you consult a reliable British pteridophyte flora such as Jermy and Camus (1991) ignoring, of course, their references to alien species that are recorded as escapes. I am sure that I do not have to remind anyone that fern allies such as quillworts and horsetails have no place in fern classes.

Three Hardy British Ferns (DISSIMILAR) might be another pitfall. Play safe and make sure that the three species are quite different, I would be reluctant to stage *Dryopteris filix-mas* with *D. affinis* unless I had complete faith in the judge. The judge may decide that they are not sufficiently dissimilar! A little more tricky are classes for foreign ferns. An *Asplenium trichomanes* exhibited as a foreign fern with the excuse that *A. trichomanes* is native to France or Germany simply will not do. Only fern species not native to the British Isles can be considered as foreign.

Having grown our ferns to perfection and having arrived safely at the show bench, we could now stick them on the table and walk away confident that we shall be successful. If only that were true. Having spent months or years cultivating our prize specimen, we must now spend a few minutes ensuring that it is a joy to behold.

Presentation

If any would-be fern exhibitors want an object lesson in how plants should be presented on the show bench, I suggest they visit any show of the Alpine Garden Society. They have made the presentation of plants on the show bench an art form. It is a skill that is easily acquired, it requires a little common sense and careful thought but it can make all the difference between first prize and no prize.

There are three aspects to presentation: the container, the plant and the overall effect. Containers, usually pans or pots, should be scrubbed clean. Whether to use plastic or terracotta is a matter of taste, but do ensure that they are clean and in good condition. Better still use new pots. Cracked or damaged containers do not give a good impression.

The plant should be in the best condition possible, without damage, pests or disease. If our plant does have damaged fronds time must be spent tidying it up. All damaged parts must be removed neatly, but try to avoid leaving unsightly gaps. More importantly, it is better to remove the entire frond rather than amputating the top few inches. Nothing looks worse than two-thirds of a frond, in this case, no frond is better than half a frond. If all this tidying up means that you are going to remove more than one third of the fronds, then it is probably not worth staging anyway.

It is usually the case that a plant has a face side, ie. a side where it has received the optimum light conditions. Very often its the side nearest the glass in the greenhouse or window sill. When staging the plant, turn it around and decide which is its best side, make sure this is the side facing the judges.

Some exhibitors try to achieve a pleasing overall effect by liberal use of limestone chippings. However, this can be disastrous. Many alpines are attractively presented with

a dressing of chippings but ferns require careful thought as to their natural surroundings. Any of those spleenworts found on mortared walls or limestone pavements will look *right* with a dressing of limestone chippings however, the forked spleenwort, *Asplenium septentrionale*, would be properly dressed with moss or granite chippings. I have always dressed my potted *Osmunda regalis* with mosses, usually *Mnium hornum* or *Polytrichum commune*. However, leaf-mould, peat or neatly trimmed grass would be appropriate. Consider the ferns habitat and try to imitate it. I have seen *Platycerium bifurcatum* dressed with limestone chippings and the overall effect was dreadful. A handful of chipped bark or moss would have made all the difference. For British ferns, Jermy and Camus (1991) will point you in the right direction.

We can now place our exhibit(s) on the show bench making sure that if our plant is small we put it at the front and if it is a large specimen it is placed towards the back. Give the pot a final wipe and turn it around to find the plants face side. Give it a final check over in case you have missed any dead or damaged fronds. If the plant needs height, place it on an upturned pot or box but do remember to disguise the support with a piece of cloth. Try to avoid using a tower of pots, upturned buckets or undisguised cardboard boxes, all of which I have seen gracing the show bench.

Now we come to the vexed question of labelling. Here you must be guided by the show schedule. Some shows, such as those organised by the AGS insist on correct labelling and the judge will take into account incorrect or missing labels. Southport Show does not insist on labels at all, so you are not obliged to provide them. However, in case of two entries of equal standard the judge might just decide to give the prize to the entry with the label. Correct and neat labelling should be a matter of pride. Give attention to correct spelling, the BPS Spore Exchange list is a very handy spell checker. Remember, you have the chance to judge your entries long before the judges sees them so try to make your standard at least as good as theirs.

Showing from the judges' point of view.

The team that judges at Southport Show consists of two judges, two stewards and a runner - a young person who takes the judging results to the show secretary's office. The show card with the exhibitor's name is placed by the exhibitor, with their pots, face down so that the judges cannot see the identity of the exhibitor and only the stewards are allowed to handle it. The judges are not allowed in the tent until the time of judging and they take with them a copy of the show schedule. Arriving at the first class on the show bench, they first count how many exhibitors have entered the class and count how many pots each exhibitor has entered. If an exhibitor has one pot too many or too few that entry will not be judged.

Each plant is examined carefully to ensure that it fulfils the requirements of the class and for any damage or disease. It is amazing how *blind* exhibitors can be to scorched fronds or *creepy crawlies* and remember, you are making the judges job easy if there are plenty of reasons for not awarding a prize! If any entry proves to be Not According to Schedule, it must be disqualified. There is nothing more depressing for the judges than to consider an entry N.A.S. The exhibitor has wasted time, money and effort staging the plants and the judges time looking at it. It cannot be said too often: read the schedule carefully and be sure that you understand what is required.

If the plants are correct and are well grown, the judges must look for other parameters to separate the entries into first, second and third. Presentation is now considered and if the exhibitors have spent time ensuring that the pots and plants are looking their very best, they can give the judges a hard time coming to a decision. If exhibits still cannot be

placed, they must now consider labelling or, if they are really desperate, begin hopefully searching for an obliging greenfly. Anything that will indicate first, second and third.

At the end of judging, the judges look forward to leaving the tent knowing in their heart of hearts that they have made their adjudications fairly and without favour yet knowing that when the exhibitors see the results, the chances are that at least one exhibitor will feel aggrieved that the judging was done by incompetents with questionable parentage. The judges however can retire from the scene with the smug satisfaction of knowing that, as long as they have observed the rules and regulations and not made any mistakes with identification, the judges decision is FINAL.

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LOSS OF FERNS IN MAURITIUS

YOUSSEF CARDINOUCHE 15 Bourbon Street, Port-Louis, Mauritius

Ninety percent of the native forest of Mauritius has been cut down to accommodate a rapidly growing population and, in consequence, many species of animals and plants have become extinct. Some plants have become so rare that they survive as only one individual in the wild! Such are *Dictosperma album* var. *conjugatum* (Palmae) and *Pandanus pyramidalis* (Pandanaeae). The last *Dombeya mauritiana* (Sterculiaceae) was found dead in July, 1994.

Many ferns which need the shade and humidity provided by these trees are in a critical situation. Of the 170 native pteridophytes, 21 species may be considered to be extinct. The others are declining rapidly.

In 1982, when I visited Tamarind Falls for the first time, I was amazed by the profusion of mosses, lichens and ferns growing in the shade of tall sideroxylon and labourdonnaisia trees. On the big boulders near the river *Asplenium affine*, *A. polyodon*, *A. viviparum* and *Loxogramme lanceolata* unfurled their graceful fronds to maximum size. Large colonies of *Ctenitis crinita*, *C. hispida*, *Blechnum attenuatum* and *Diplazium proliferum* formed a tangled mass of foliage on the forest floor. High on the branches *Asplenium nidus*, *Elaphoglossum petiolatum*, *E. sieberi* and *Microsorium punctatum* were competing for light. One of the most beautiful epiphytes, *Vittaria elongata* was sending its long, pendant ribbon-like fronds in hundreds, giving this forest a fairy-like appearance. The lower parts of the trunks were draped with a thick mass of *Trichomanes* and *Hymenophyllum* ferns.

In the mid 1980s there was a great demand for new fern varieties to replace the old cultivars of *Adiantum raddianum*. Villagers from around Henrietta saw an opportunity to make money quickly, and hundreds of *Asplenium*, *Ctenitis*, *Diplazium* and *Spheromeria*, as well as orchids were stolen and sold in the streets of Port Louis and other cities. Most of these ferns did not survive the shock and were soon thrown in the bin.

Paradoxically, all our native ferns are protected by law, but there is no sanction to poachers. In July 1993 I returned to the falls. Not a single *Asplenium*, *Diplazium* or *Vittaria* was left. Only the mosses and lichens had survived. This is one of the many places devastated by fern hunters, and this is still going on!



The first in a series of 14 falls of Tamarind



The fern collector-vendor and his wares

FOR SALE

Pityrogramma calomelanos, *Pityrogramma aureaflava*,
Histiopteris incisa, *Sphenopteris chinensis*, *Asplenium lineatum*,
Asplenium daucifolium, *Asplenium nitens*.



Mauritius rarities for sale

FERN HUNTING IN EASTERN CRETE

JAMES MERRYWEATHER, *Biology Department, University of York, PO Box 373, York YO1 5YW.*

If you want to make new records for pteridophytes, Eastern Crete appears to be ideal territory. I'm writing this after only two days of walking and botanising and already, most of the ferns I have found, though common, do not appear where I was on the distribution maps in the main work on the distribution of Cretan plants: *Flora of the Cretan area* by Turland, Chilton and Press, 1993.

I've run quickly through the comprehensive bibliography in this work and the majority of publications cited are - surprise, surprise - about the orchids of the island. There are but four publications which specifically mention ferns. Three discuss critical taxa and the other (Brownsey & Jermy, 1973) is about a fern collecting trip in Western Crete. The distribution of the common species appears to have been ignored so, simply going for a walk can produce lots of useful pteridological data. They're almost all new records!

I am (or rather *was* by the time you read this) based in the town of Aghios Nikólaos, having purchased a very reasonably priced package holiday at the beginning of April. I just missed the worst of the weather, I have been told, and have had two (7) happy days of hard, sun-burning walking through olive groves, along country tracks to altitudes of up to 650 m. All the way there has been botany and, occasionally the flowers have rendered me utterly spell-bound.

As a taste, I offer you;

1. Olive groves, carpeted yellow with the South African weed *Oxalis pes-caprae* which is commonly infested with the broom-rape *Orobanche ramosa*. Among the olives are many surprises, including damp flushes where you find sedges, rushes, marsh orchids such as *Orchis laxiflora* and other plants you might not expect to encounter in such an arid place.

2. Waysides and "Garigue" with bushy rock-roses (and their attendant parasite *Citinus hypocistis*, a relative of the world's largest flower *Rafflesia*), spiny burnet *Sarcopoterium* and herbs, herbs, herbs! There is purple-flowered sage, yellow *Phlomis* (from which the Cretans make the revolting, but apparently efficacious diktamos tea), several versions of thyme, oregano, wild garlic, fennel - the complete herb garden, and all of real culinary value.

3. Steep lower mountain slopes are dotted with bright yellow-green bushes of several species of arborescent spurge, *Euphorbia* with sage and *Phlomis* for added colour accompanied by the constant buzz of honey and bumble bees.

4.and then there are the incomparable limestone rock gardens ("Phrygana") with the tiny white *Gagea (Lloydia) graeca*, white or bright yellow (sometimes pillar box red) "poppies/amemones" which are actually buttercups, *Ranunculus asiaticus*; the elegantly pendant quaking grass *Briza maxima*; a wide assortment of leguminous species with every habit and flower colour you can imagine; minute, lacy umbellifers and all sorts of white and yellow composites. Many of these plants are being voraciously fed upon by a wide assortment of



Gagea graeca
with *A. ceterach* & *S. denticulata*

broom-rapes, *Orobanche spp.* And then there are orchids dotted about everywhere. Tiny purple *Orchis anatolica*, *Ophrys lutea*'s innocent little yellow faces turned up to look you straight in the eye, mysterious *Serapias*, gaudy *Ophrys tenthredinifera* and *O. heldreichii*, the rather vulgar *Barlia robertiana*, and many others.

Back to the ferns. Four species were ubiquitous around Agios Nikólaos: *Asplenium ceterach*, *Cheilanthes maderensis* (syn. *C. fragrans*), *Anogramma leptophylla* and *Selaginella denticulata*. Each lived in slightly different situations and tolerated the hot sun to different degrees. *C. maderensis* abounded in the cracks in the limestone of the area, right down to sea level and to over 300 m. It could also be found in most urban situations. Walls in the village of Pano Elounda were plastered with it and rusty-backs, and I found it occasionally in the heart of Ag. Nik. This species grew out in the sunshine, and was beginning to prepare for summer shrivelling from which, like *A. ceterach*, it has the capacity to recover. However, I rarely found the latter down at sea level. I had to climb a bit before finding it, and usually discovered that it had found itself a little shade in which it thrived.

Another species which can happily desiccate for the summer is *Selaginella denticulata*. It was everywhere, scrambling over rocks and soil, usually with a little protection from direct sun, but green, lush and sporulating where shaded, pink-red and drying out where not. The fourth common species definitely cannot tolerate sporophyte desiccation, but it has an alternative strategy (see page 242). It is the annual fern *Anogramma leptophylla*. I rapidly developed an instinct for where it should be found, and I reckon it was just about everywhere, as long as it had a pocket of soil (either an earthy bank or a crack in a cool rock face) and shade. There was always a little shade, or it grew where didn't catch the mid-day sun. It grew upright, each stipe arching out and up, to hold the fronds away from the rock, and the upper frond surface towards the light and the viewer-photographer. It was at its best on the walls and banks supporting the semi-circular terraces which each support a single olive tree on the steeper slopes, for example in the valley between Kroustas and Kritsa. Here it can be found associated with *A. ceterach* and *C. maderense* which are also at their most vigorous



Anogramma leptophylla

Two other species, both to be expected, turned up. I found a couple of plants of *Polypodium australe* as I hauled up the lower slopes of the Thripti mountains from Kavoussi - perhaps the best walk I have ever done in my life! At the west end of the island it is quite common, but here?....I hunted diligently. Occasionally I encountered the blue-grey, fuzzy fronds of *Cosentinia (Notholaena) vellaea*, hairy above and hairy beneath to protect it from desiccation. I found this plant sporadically occupying the most exposed rock faces at low altitudes where heat and drought must give it a rare run for its money.

One further pteridophyte took my attention, just before I caught the bus on which I just happened to bump into sometime BPS committee man, Patrick Acock's son! [As I tried to hold a surprised conversation with him I was under constant interrogation about Cretan ferns by a wild flower twitcher who had spotted my BPS tee-shirt]. Between the road and

the sea at Pachia Ammos there were acres of *Equisetum ramosissimum*, very erect with cones all over.

If you care to visit Crete, get there in early April and risk the changeability of the wather. There is a series of excellent books from a publisher called Sunflower which provide walking itineraries for many places, especially in the Med. There are two for Crete which may be bought here or there: *Landscapes of Eastern Crete* and *Landscapes of Western Crete* by Jonny Godfrey and Elizabeth Karlake. They present the best way of getting into the countryside of new places and, although their instructions are rarely perfect, they do take you to the best places, eg. the walk up from Kavoussi (#8) which, now I've done the whole 11-15 mile trudge, I would recommend simply up and back again through the most fabulous mountain botany. I have nowhere near *done* Crete, and will return as soon as I can, but there's plenty out there for you too. I will happily offer a few hints if you ask.

A CORNISH TIN MINE AND ITS FERNS

ROSE MURPHY, Shang-ri-la, Reskadinnick, Cambourne, Cornwall, TR14 0BH.

Phoenix United Mine stands below the Cheesewring on the eastern side of Bodmin Moor. Formerly a copper mine, its ruins are now surrounded by poor quality, sheep-grazed grassland and an expanse of mine waste. Streams in the area contain high levels of copper that impart a characteristic blue colour to any algae growing in them. Copper tolerant mosses and liverworts grow nearby.

Ferns were not expected to be abundant in such a place, and at first sight the most frequent is *Pteridium aquilinum*, pushing its way through brambles and gorse, forming widespread stands in invading willow scrub and grassland. Around the ruins, in the shelter of the old walls, are extensive growths of *Cotoneaster integrifolius*. This small-leaved cotoneaster, a wide-spread garden escape, provides a home for *Athyrium filix-femina* and *Dryopteris affinis* morphotype *borreri*. Within the partly restored engine house and around the apparently filled-in mine shaft are huge fronds of *D. filix-mas*.

Asplenium trichomanes ssp. *quadrivalens* is the other common fern. It grows on every ruined mortar wall save one. On this one, and this one alone, *A. ruta-muraria* grows in abundance. The stones here are narrower, the proportion of cement greater and, wherever cracks have appeared, the wall rue has been able to send its roots back through the surface Portland cement into the old lime mortar. The *A. trichomanes*, on the other hand, seems able to get a purchase only where the Portland cement has broken away exposing the underlying mortar with its constituent clinker and fuel ash.

Portland cement weathers to produce not only calcium carbonate, but also a proportion of calcium aluminate and silicate. It is extremely alkaline to begin with (pH 12.5) but, as it carbonates, the pH comes down to 8. Lime mortar weathers to calcium carbonate only, presumably not so alkaline. Is wall rue more tolerant of high pH, or more tolerant of aluminates and silicates? Its spores must settle and germinate on Portland cement before root growth exploring the preferred old mortar takes place. I do not know the answer, but it will be fascinating to find out. Certainly, at least here, wall rue does not compete with the maidenhair spleenwort, and the other fern which might have been expected, namely *A. ceterach*, could not be found, even though it grows on walls at a nearby farm.

Other ferns found here are *A. scolopendrium*, *Polypodium interjectum*, *P. vulgare* and *A. adiantum-nigrum*, but not in such great numbers, and only one plant of the black spleenwort was seen. The commonest shield fern in Cornwall is *Polystichum setiferum*. Any records for *P. aculeatum* are to be treated with caution. There are just three

authenticated specimens, these dating from the 1860s and 1870s. Two of them are in the herbarium of the Natural History Museum. All are from the very south-east corner of the county where base-rich rock outcrops occur. Searching through the herbarium, with the kind help of Josephine Camus and Alison Paul, I came across one of the *P. aculeatum* "look-alikes" - I can think of no better term to describe them. Against this specimen the late Anne Sleep had written: "I think this is *P. setiferum*. At Phoenix mine, quite unexpectedly, a member of the BPS, Mary Atkinson, came across genuine *P. aculeatum* growing with lady fern and maidenhair spleenwort in hollows at the base of a mortared wall. There are only six mature plants and eleven younger ones at various stages of development. How did this fern, so rare in Cornwall, get there? Was it formerly more widespread?

Phoenix mine has proved to be a fascinating place, and my final fern note again concerns *A. trichomanes* ssp. *quadri-valens*: four plants growing on elder, rooted into the moss that so abundantly covers the bark. Other shrubs and trees (willow and ash) grow amongst the ruins, even another elder, but only this one supports maidenhair spleenwort. A block of granite is trapped between two of the branches, but there is no trace of mortar around it. Has the fern spread from nearby walls? The bark of elder is rich in nutrients and its pH approaches neutral, so it is possible. Epiphytic ferns in Britain have received scant attention, so I intend to address this topic in a future article in *Pteridologist*. I would be pleased to hear from any readers who have observations on this topic to add to mine.

CONSERVATION IN ACTION

JACK BOUCKLEY, 209 Woodfield Road, Harrogate, N. Yorks. HG1 4JE.

About half a mile from where I live is a lovely ferny wooded area along the banks of the river Nidd and a couple of its tributaries. This beauty spot is called Bilton Gorge, situated to the north of Harrogate starting at OS ref. 44 304 583 and going downstream about two miles. The Woodland Trust have owned the first mile for a few years, BUT then the lower mile came up for sale and all sorts of businesses began to take an interest. They could build. They could make pleasure areas, and maybe the odd amusement arcade or two, all of which could ruin this almost untouched, natural area.

For quite a long time the Bilton Conservation Group have worked with the Woodland Trust, maintaining footpaths, planting trees and generally keeping an eye on wildlife in the gorge. If the remaining part were to get into the hands of the developers, much of this work would be in vain.

The Woodland Trust was as worried as the locals, but how could the asking price of £100,000 be raised in just a few months? No-one had this sort of money spare, so it would have to be raised by and from people who were concerned about the future of the gorge. Fortunately the Woodland Trust would be able to buy it if a large sum could be raised locally.

Two members of the Bilton Conservation Group took on the task of fund raisers. They arranged sponsored walks, open gardens and a host of other events as well as persuading local businesses and individuals to pledge cash. It seemed impossible, but when it looked as though the bottom of the barrel had been scratched and that the sum required could not be found, a large sum was given to the Trust by a concern who had been amazed by the efforts of the locals.

The asking price was now available, but that was not the end of it. The vendor now wanted 20% more, another £20,000! Where it came from I do not know, but I do know that the Woodland Trust eventually settled on £117,500 plus legal fees.

So, thanks to conservation-minded local people this lovely wooded gorge with all its ferns is safe. An interesting point is that the Woodland Trust also bought Hack Fall, a few miles away, on a 1,000 year lease. This is another ferny place in the Harrogate area, much loved by the late Dr WA Sledge.

You may ask why this article appears in *Pteridologist*. The answer is that some members of the local BPS group* were active in the cash-raising effort, aware that conservation cannot simply be left to other people. Actions speak louder than words. I hope that members of the British Pteridological Society will keep this type of work going nationwide.

SHORTER NOTE

A scrape from a skimpy scollie

Two or three years ago, when visiting my daughter in hornsea, Humberside (East Yorkshire as was) I spotted a few *Asplenium scolopendrium* growing in the mortar of a retaining wall at one side of the road. Of course, there is nothing unusual in this. Scollies grow well in many places, but these were very stunted - or skimpy - and had rooted into the south-facing side of the wall without any shade. As I looked closer at the plants it became apparent that one frond - and only one - was different from all the others. It was quite normal except that the top one and a quarter inches on one side was beautifully scalloped, but not crisped.

I turned this decrepit little thing over to see if it was fertile and there, sure enough, in the scalloped part, was one sorus, less than one sixteenth of an inch long. I made a spore envelope out of an old receipt and, with the aid of my pocket knife, scraped the sorus in.

Back at home, a few days later, I sorted out the package contents and sowed the spores. After a while three prothalli appeared, and from those I managed to get one plant on which four fronds were perfectly scalloped on both sides, but only in the top half. The frond nearest the crown was normal.

At the time of writing (October, 1994) there are no sori visible, so I am just living in the hope that eventually I will have spores and, that with careful selection, I will eventually get a plant with fully scalloped edges.

I have found in the past that quite a few scollie varieties do not come true from spore, so it is quite important to select wisely. For example, from a 1993 sowing of *A. scolopendrium* 'spiralis' I have just one plant which is showing the correct characteristics. The remainder were partly marginate or plain.

JACK BOUCKLEY



* Notably the very modest author - ed.

HAZARDS OF FERN COLLECTING IN ECUADOR

ROBERT G. STOLZE, 912 Pirate Cove Lane, Vero Beach, Florida



Bob Stolze with symphonie

Having recently retired from my position as Associate Curator, Pteridophytes, at the Field Museum in Chicago, I had assumed that the writing of fern articles was well behind me. I reckoned, however, without the gentle persuasion of James Merryweather, with whom I share the unusual dual interest in Pteridology and Early Music. Indeed, it is the latter which indirectly has occasioned the present contribution to *Pteridologist*. During James's visit to the Field Museum in August of 1993, I coerced him and his bagpipes, shawms and the bass curtal which I covet, into joining me and a member of my *Ars Subtilior* ensemble in the presentation of a Medieval-Renaissance performance for the Museum's "World Music" series. Recalling that event in a recent letter, my friend claimed that "I owe him one*", and wondered if I might submit to this journal a piece describing some of my fern collecting experiences in the Neotropics. I am happy to oblige with some reminiscences of my final field trip: searching for *Diplazium* in Ecuador.

Pursuant to my studies of the genus *Diplazium* for the Flora of Ecuador, I conducted two months of field work in this fascinating country, from mid-January to mid-March, 1992. There are few regions on earth where fern speciation is so rich as in Andean South America, therefore I was reluctant to complete this part of the Flora without one last exhaustive search for the genus I was studying. Before my research had begun, estimates of its species in Ecuador ranged from 40 to 60. When my trip in 1992 had ended, I had visited all but three of the 20 provinces and had searched for *Diplazium* in 13 of them. Among the hundreds of collections made, two species and one variety turned up which are new to science. Thus, of a total of 300 species of *Diplazium* in the world, 55 now are known to occur in the country of Ecuador (roughly the size of Great Britain).

Diplazium, likely a stranger to fern fanciers of temperate zones, is found in tropical regions of both hemispheres. It is rather closely related to *Athyrium* and *Asplenium* - in fact until recently a few species of both had been mistakenly included within it. Its indusia, like those of *Asplenium*, are long and narrow and affixed to the vein. However, in most species the indusia are doubled - that is to say, opposed, or back-to-back on the same vein. Also, like *Asplenium*, the fronds of some species bear a proliferous bud or two near their tips which, if making contact with the forest floor, can propagate vegetatively. Unlike *Asplenium*, the leaves of *Diplazium* are often much larger and thicker in texture. Moreover, some species resemble tree ferns, for their trunk-like rhizomes can be 2 inches thick, erect, and grow to a height of three feet. Fronds of these species are often three- to four-pinnate and over 10 feet long. The size of the plants, obviously, presents special problems to the collector who is attempting to convert them into herbarium specimens. In order to preserve all the characters necessary for proper classification these monster leaves must somehow be cut to fit a standard herbarium sheet. This was

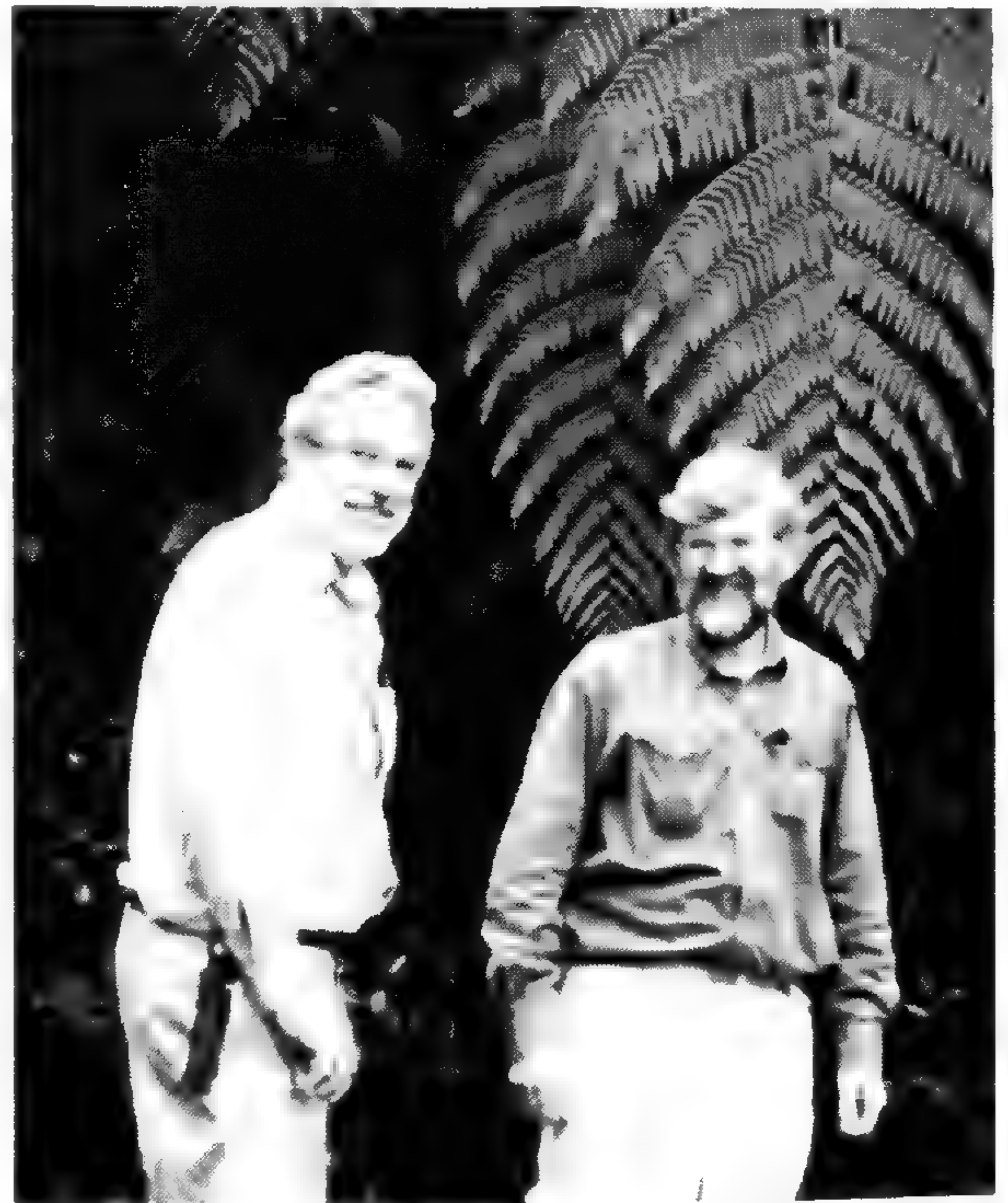
* To tell the truth, it is I who am in debt for a splendid welcome from a great pteridologist and his family when I arrived, an unknown entity, in Chicago - ed.

where my wife and able assistant, Sue, was so invaluable in the field. While I was lopping off the huge leaves, she systematically cut them into manageable portions: 1) a 15-inch piece of the apex; 2) a section of the leaf base, containing a portion of the petiole; 3) a center section of the rachis containing one or two pinnae. Back in the herbarium, this results in a 3-sheet specimen which contains all the vital diagnostic characteristics the experts need for their studies, without trying to preserve the entire 10-foot frond. Years ago, during research on the tree fern genus *Cnemidaria*, I wrote detailed instructions on the preparation of huge specimens - ferns, palms, etc. - to which I refer the interested reader. (Professionals also take note!).

My labors were lightened immensely by several happy circumstances. Dr. Benjamin Øllgaard* (Aarhus University in Denmark), an old friend and colleague, was finishing a 3-year term with his family in Quito at this time. Benjamin, Co-ordinator for Pteridophyte contributions to the Flora, was also directing a Danish program of field work and academic studies at the Catholic University in Quito and knew the country as well as a native. He furnished me with access to the excellent University herbarium, work space and plant drying facilities, offered full logistic support, and acted as driver, guide and companion. On the few occasions when Benjamin was otherwise occupied, one of his undergraduate fern students, Hugo Navarrete, served as an alternate in all capacities. Last, but certainly not least, was Sue's collaboration as field and herbarium assistant. Her efforts greatly shortened the hours of separating and bagging ferns in the field,

of drying and cataloguing specimens back at the University, while further performing in the function of field photographer. In all my previous collecting experiences I had never been so well served.

All major expeditions into the field began at Catholic University in the heart of magnificent Quito, which is situated on the central spine of the Andes near the Equator. Its lofty perch of nearly 10,000 feet quite offsets the effects of the otherwise steamy latitude and thus rewards residents with a pleasing climate of eternal Spring. (For visitors, however, the reverse side of this coin is a week or two of mild altitude sickness, until the lungs and circulation adjust to the thin air). From here we launched our search for ferns along every point of the compass. Due east we crossed over the continental divide at 14,000 feet on our first shakedown cruise into the countryside. No *Diplazium* at this altitude near "timberline", but on the cold and wet Paramo de Guamaní were plenty of hardy Lycopods (Benjamin's specialty) as well as some *Isoetes* and a few hardy *Grammitis* and *Asplenium*. I think this trip, during our first days in Ecuador, may have been planned to test our endurance. If so, we nearly failed the examination, for our hearts, lungs and legs were pushed to the limit at this ungodly altitude. Not only were Sue and I 20 years older than our host, but I had only recently recovered from a bout of flu in Chicago that had me on my back for six weeks. Consequently, it was a great relief to me when we pushed on through the high pass and proceeded downward into the eastern provinces of Napo and Sucumbios, towards Amazonian Brazil. Ferns and other pteridophytes are found in Ecuador from sea-level to over 14,000 feet, but the range of *Diplazium* is more limited:



Bob & Ben and tree fern
Laphosoria quadripinnata

* Author of the beautiful *Scandinavian Ferns* (see *Pteridologist* 2, 5 1994 210-211)

100 to 11,000 feet, with the majority of species occurring between 1500 and 8000 feet, in the deep shade of thick, wet forests. At these altitudes, the climate is not too steamy, the lungs are happier, and *Diplazium* sightings the most frequent.

To the north, journeying through Esmeraldas and Carchí, our search took us near the Colombian border, where human population thins out and the vegetation is less harassed. Some ferns, including a few species of *Diplazium*, can always be found in disturbed areas, such as along the roadside cuts. But virgin, or only partially disturbed, forests quite understandably yield the greatest finds, so we were constantly on the lookout for areas less frequented by *Homo sapiens*.

For these reasons we planned our most ambitious trips to the south of the country, down toward the Peruvian border. Here, in the sparsely settled provinces of Zamora-Chinchipec and Morona-Santiago, species diversity was most pronounced. It is not surprising, then, that I was most excited during these forays. Shouts of "another *Diplazium*" rang out repeatedly and, in patches of virgin forest, at low to mid-elevation sites, we located the two new species, one in each of the provinces.

In the Pacific lowlands to the west of Quito the population density explodes, but along the west-facing, mid-elevation slopes can still be found some good pockets of forest. The trick is to locate areas where the topography is strongly broken. Obviously, crops and cattle are not very happy clinging to the steepest inclines, so the eyes of the plant collector are constantly peeled for sites which are least hospitable to Man. With diligence, luck, and persistent questioning by excellent guides, the pteridologist can succeed here in the quest for valuable specimens.



Diplazium immensum spec. nov.
(...and the guy holding it is also immense!)

Why is there such rich speciation of ferns in Ecuador? The most obvious reason is of course the climate. They do not have to endure the winters of Britain or temperate America. If they needn't cringe from the snow and cold several months a year, they can thrive in continual comfort. No matter what habitats are best for ferns, they can be found in Ecuador: densely forested, steamy lowlands for those which prefer it warm, dark and wet; broken topography at mid-elevations for those which need a little more light; pockets of continually wet cloud forests at higher elevations; steep wooded slopes for those which need to reach out horizontally for even more sun; misty ravines and edges of waterfalls for those preferring perpetual mist; moss-covered tree branches for the species which are happier perching above the ground (epiphytes).

Needless to say, the favorite haunts of many *Diplazium* species are not readily accessible. Patches of wet virgin forest do not cluster along the main highways, inviting the eager pteridologist to hop out of a car, scoop up a half-dozen likely

specimens and proceed leisurely to the next site. Principal roadsides throughout tropical America have been denuded of good forest long ago, so botanists must search out the rutted side roads which afford access to the back country. Our solution to this stumbling block was at hand in the person of Benjamin Øllgaard, with the powerful vehicles provided by his DANIDA program at Catholic University. Benjamin's favorite was the big Toyota, an army tank masquerading in the guise of an oversized station wagon. Its rugged construction afforded superb road clearance while the 4-wheel drive pulled us through deep ruts, forded mountain streams, and ploughed through seas of mud which reached to the axles. Passenger space comfortably seated four and the cargo space carried gear enough to outfit us for weeks of collecting and travelling, if need be.

Having the services of an M1 Tank to carry us into the back country was but part of the solution, for lacking a good driver and guide to navigate the nearly impassable trails, the Toyota may as well have rested in the University parking lot. Benjamin is not only one of the finest drivers with whom I have travelled, but he can smell out ferns and virgin forest like a Retriever. Moreover, his fluent Spanish and engaging personality served continually to solicit directions and obtain permission to enter private land in our quest for ferns. Consequently, once in a likely area, it didn't take him long to ferret out the quickest approaches to collecting sites.

Benjamin's detective work occasionally brought us to patches of roadside forest so rich in species that we were relatively successful in making good collections within a few yards of the road. In these situations Sue and I could have been in our nineties, picking up specimens from our wheel chairs - it was that easy. Along certain mountain trails it was not uncommon to spot a *Diplazium* from the rolling Toyota, to be popped in our bags without further ado. The more common scenario, however, was to hack our way with machetes into the dense montane and rain forests, an alternative which was exhausting and time-consuming. To overcome these obstacles we generally searched for a narrow logging trail, stream, or ravine, which cut down the mountain slopes, permitting much easier access through the hellish tangle of vines and thick undergrowth. Many ferns grew in luxuriant abundance along stream or ravine banks, or at least could be spotted within a few machete hacks of our vantage point.

Nevertheless, it was often frustrating for a couple of sexagenarians in dubious physical condition to keep pace with "Benjamin the Bull" and "Hugo the Mountain Goat" as our troupe advanced through the jungle. Benjamin, of the perpetual sunny smile and blond-bearded face, with rippling muscles, cord-like legs and broad shoulders, used his machete only when he had to. Most frequently, he simply ploughed through the tangle like a bull in a china shop, ripping through vines, bowling over saplings and other lower vegetation, while each fern in the vicinity cowered in apprehension at his approach. We always knew where he was - we could hear him a quarter-mile away. Hugo, with dark and sparkling eyes set in a handsome face, was small, lithe, wiry and indefatigable. On our first trip together he earned from me the title of *cabra del monte*, as I watched him bounce from rock to rock down the tumbling cascades, scramble up steep slopes as if they were mole hills, and buzz-saw his way through the underbrush, machete flashing tirelessly. Pity, then, the two ancient Chicagoans as they attempted gamely to keep up with this Dynamic Duo through the backwoods of Ecuador. More's the surprise that they not only survived, but came away from each trip with *Diplazium* bulging from plant presses as well.

We also endured a few other harrowing experiences, which are here briefly related. In order to enter certain patches of forest it was often necessary to cross streams too deep and swift to wade (to paraphrase a well-known axiom: "Ferns grow greener on the other side of the river"). Streams often intersected well-worn country paths, at which spots locals had erected bridges of various description. Across broad waterways we found

suspension bridges supported by thick ropes, with rough wooden planks serving as a floor. Larger streams were crossed by means of logs anchored to pilings in the center of the current, usually with a single or double handrail to steady the walker. Smaller streams were spanned simply by two or three parallel logs wedged into the mud at either bank. Now, in Chicago, all public bridges, elevators (lifts) and the like were provided with conspicuous legends which announced the date of the most recent city examination, along with appropriate inspection dates. Therefore we happy citizens used these structures and conveyances secure in the knowledge that a competent and licensed individual has guaranteed our safe journey. This is not exactly the case in the forests of Ecuador, where discretion is always the better part of valor. One always should assume that the planks and ropes were installed 30 years previously, and that the only time either are replaced are when they have broken through. Consequently, we approached each crossing with timidity.

Imagine, if you will, a raging torrent 100 feet wide, over which a suspension bridge has been thrown, and you have to cross it with camera, machete, water jug and collecting bags filled with ferns. The stanchions are perhaps eight feet tall at each bank, allowing for just enough sag at the center of the bridge to prevent the floor from dragging in the current. There are no step ladders to get you to the bridge deck. Instead, there is a length of bamboo trunk about seven inches in diameter, with broad notches cut in the internodes to serve as footholds, which you scale with some trepidation. Next, with gear held in one hand, or otherwise slung over the shoulder, you grab a suspension rope with the other and begin shuffling along the bridge floor, bearing in mind that the wooden slats might have been laid the year you graduated from primary school. Cleverly, you plant each foot where a latitudinal slat intersects with a longitudinal runner, hoping that if one board breaks, the other may hold until you have successfully planted the other foot. Meanwhile, the bridge bounces and sways with your weight as you progress down the slope towards the center of the river. Upon reaching this point (especially if you weigh 15 stone as I do) the bridge floor has bent uncomfortably near the rushing water, prompting you to move faster, even at the risk of ignoring where you place your next step.

One day, our whole company having safely crossed and re-crossed the Río Dashiño, I was sorely tempted to affix a placard to a bridge stanchion, in Spanish: "Bob Stolze (210 lbs.) safely crossed here with a bag of ferns, 15 Feb. 1992". Perhaps some little old lady, some months later, would take comfort in the knowledge that if the big American had tested it out, she and her little bag of firewood might make it to the other side. However, I had neither placard nor nail at my disposal. Furthermore, my being so hot and tired at that juncture quite overrode my Samaritan intentions, but I suppose to this day the bridge still sways in place.



Sue & Bob with natural *Gunnerumbrella*

Unfortunately, there was one bridge not left in place after our crossing, much to Sue's chagrin. The Stolzes, with Hugo as guide, were following a footpath in western Pichincha Province some miles north of the village of Puerto Quito. Between us and a likely patch of forest was a small stream, over which three 8-inch logs had been placed by the locals.

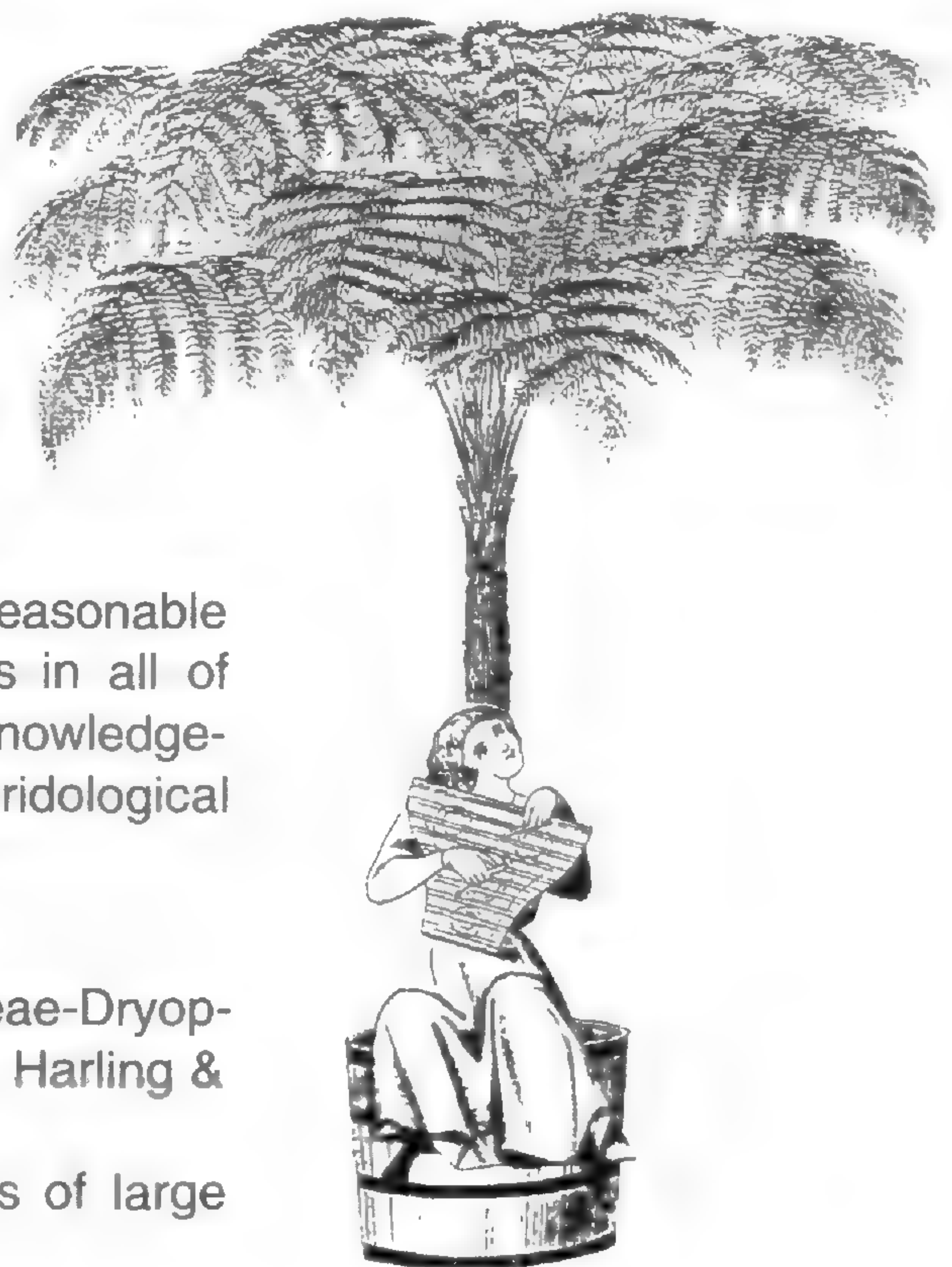
First to test the "bridge" and cross it was the redoubtable Hugo, who cautioned us to shuffle over it sideways, so as to distribute the weight on two of the logs, not just one. The second to execute safe passage was the heavy member of the party, and now it was assumed perfectly safe for Sue. However, this lady developed a balance problem and shortly into her crossing began to sway precariously on the bridge, whereupon she cried out, "I just can't do it this way" and proceeded gingerly to walk the logs in a more normal manner. All went well until she neared the bank, when, with a crack and a squeal, lady and log were deposited unceremoniously into the water. Luckily, the water was about 5 feet deep, with no bone-breaking boulders in its bed, and Sue is an excellent swimmer so the only things lost were her pride and dignity and her cap which floated merrily downstream. To add insult to injury, on the return trip Hugo found another route back to our vehicle which circumvented the stream. Had we known this at the outset the incident could have been avoided (but then Sue would not have the fascinating tale to relate).

There were more river crossings I could describe, such as being ferried one at a time across a large and distressingly turbulent river in a dugout canoe captained by a 14-year old boy; and other escapades involving hazardous drives along roads that swam in mud or skirted the edge of a precipice; and of truly Spartan accommodations in remote villages. Suffice it to say that some botanising in the Andes requires a stiff upper lip and/or a devil-may-care attitude; but it gets the job done and puts valuable specimens in our herbaria. Moreover, the collecting opportunities are superb in the Andes, and there is a need to gather its scientific wealth while the plants still exist. Interestingly enough, the job can be shared by well-informed and dedicated amateurs, as well as professionals. I know a retired couple who have made excellent collections in areas as disjunct as West Africa and Ecuador, which are now deposited in the herbaria of The Field Museum and the Missouri Botanical Gardens. Perhaps they did not break log bridges or cross rivers in dugout canoes, but their contributions have added greatly to taxonomic botany.

In Ecuador, there still remain areas which are relatively approachable and rich in ferns. Given the rapid destruction of good habitats (now rampant everywhere in the world) and the latent volatility of political conditions in South America, how long the conditions will last is of course open to question. But at the present writing, this small country is ideal for the study and collection of pteridophytes. It has remained politically stable for several decades, the destruction of forests here has not been quite as rapid as in other neotropical countries, and the travel and living is relatively unexpensive. The people are friendly (except in certain depressed urban areas) and, with the exercise of reasonable precautions, it is one of the safest countries in all of South America. With proper planning and a knowledgeable guide one can still unearth much pteridological wealth, given the proper dedication and desire.

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THE FERN SUPPLIERS

Last year's *Pteridologist* featured two British growers but there has been no further response from this country - maybe next year please?

Meanwhile, here's a welcome contribution from some trans-pond friends.

FOLIAGE GARDENS

SUE and HARRY OLSEN, Foliage Gardens, 2003 128th Ave. S.E., Bellevue, WA 98005 USA

When your editor requested biographies of nurseries I smiled, thinking of how often these things happen more by accident than by design. In the mid 60's I was completely smitten by a planting of *Dryopteris erythrosora* in the Seattle garden of the late Carl English who was then curator of plants at the Ballard Locks gardens. I could not find *Dryopteris erythrosora* anywhere so I chose to try to grow my own. I had been propagating rhododendrons for many years but this was the first attempt at ferns from spores. I knew nothing about their propagation but armed with a fluorescent light and a small basement table, I suddenly found myself with 300 baby *D. erythrosora*!!!!!! **And** - that was it for the rhododendrons! (Actually they became companion plants!) Membership in the American Fern Society followed shortly thereafter (BPS membership would come...it was just a matter of time) and one fern led to another. The late Neill Hall who was then Curator of the Spore Exchange for the AFS was most enthusiastic with his encouragement and it wasn't long before I was part of a small but active fern study group in the Seattle area. (Several members of this group years later became the nucleus of the group which founded The Hardy Fern Foundation).

At first the surplus ferns were given to assorted local charitable plant sales, but it soon became obvious that the time had come to establish a business and thus was born Foliage Gardens. As John Mickel notes in *Fern Horticulture: Past, Present and Future Perspectives* (page 260):

"Even until 1970, though, the selection of available fern species was limited almost entirely to a smattering of native American species plus a few English crested ferns and two species



Harry and Sue Olsen at day's end, University of Washington Arboretum plant sale, Seattle.
[Does it always rain on American Pteridologists?]

from Japan, *Athyrium nipponicum* cv. 'Pictum' and *Dryopteris erythrosora*. A major impetus for public interest in fern cultivation was the establishment of two nurseries in the Seattle area. Sue Olsen was the first to break the impasse in 1970 with her mail-order nursery *Foliage Gardens*".

And so it was that I was swept up and launched on what has been an exciting search for new predominantly hardy species that I could add to our North American gardens.

There was very little current literature available until the publishing of the late Reg Kaye's classic book *Hardy Ferns* which arrived in American bookstores in the early '70's. At last we had a resource and a chance to really learn. A real boost to my motivation to learn came with an invitation to lecture at the 1972 annual meeting of The American Horticultural Society and with Reg's help I had a good idea of what would be hardy, ornamental and practical in the fern garden. As *Foliage Gardens* was expanding exponentially by then this was also helpful for developing the mail order aspect of the nursery (I would say "division" but this was a one person operation).

About this time the Northwest Horticultural Society decided to promote the use of ferns via an annual plant sale which I chaired and continue to chair today. That has subsequently expanded to a Fern Festival with displays, speakers and garden tours. Our speakers have included BPS members Chris Page, Reg Kaye, Barbara Hoshizaki, John Mickel, and Carl Taylor among others. I have also been very active with The Hardy Fern Foundation which was founded in 1989 to test ferns throughout the United States for hardiness and ornamental value and to promote and distribute them for public and private gardens.

In 1990 the nursery took on a new dimension when my husband Harry retired from his position at the Boeing Company (and started working for me at a nickle an hour). He had enjoyed a love for Japanese maple cultivars for many years without the time to indulge his enthusiasm. Once he became involved with building a collection and propagating, it wasn't long before we wondered how he ever had time to go to an office! So in 1992 *Foliage Gardens* added maples to our offerings...now customers can buy shade along with their ferns. All this is taking place on an almost one half acre lot which the nursery shares with our house and garden. We are crowded!

We have been on many marvelous trips some of which were specifically programmed around ferns i.e. China, Oaxaca, and the outstanding BPS Centenary. We've been introduced not only to exotic ferns (many of which are now in the nursery catalog), but to some wonderful people. Over the years *Foliage Gardens* has introduced well over 100 types of ferns from all over the world to North American gardens and produced a video: *Foliage Gardens Presents a Short Course on Ferns*. All of this is the result of that original quest for plants of *Dryopteris erythrosora*. It has been very rewarding and we look forward to many more years in the delightful world of plants and plant people.



FOLIAGE GARDENS

THE FIFTH ANNIVERSARY CELEBRATIONS OF THE NEDERLANDESE VARENVERENIGING (DUTCH FERN SOCIETY)

MARTIN RICKARD, Kyre Park, Tenbury Wells, Worcs., WR15 8RP

Just before 9am on Friday, 2nd September 1994, my wife and I arrived at Alphen an der Rijn in central Holland. We were outside the nurseries of Hans Lemkes, soon to be joined by Helmuth Schmick (from Glinde in Germany), Jan Greep (secretary of the Nederlandse Varenvereniging) and Pieter Hovenkamp (of Leiden University, our interpreter). After a very welcome cup of tea in the nursery foyer our group was shown through greenhouse after greenhouse of small ferns in plugs. Lemkes seems to be the largest producer of ferns in the world, with about 120 different hardy taxa available.

Conditions for fern production have been optimised so that from sowing to saleable plug only takes 6 months or so and, since the principal season for hardy fern sales in this form is spring, the season is geared for sowing in September for sale in May/June. At the time of our visit the nursery season was directed towards an alternative crop - about 50 different kinds of tender fern. Most noticeable were the various forms of *Nephrolepis*, *Adiantum*, *Pellaea* and *Pteris*, but I was also pleased to see *Asplenium nidus*, *Blechnum gibbum*, *Davallia fijensis*, *Humata tyermanii* and *Platycterium alaicorne*.

My interest is primarily hardy ferns, but I was not disappointed as the nursery does hold a good collection of "mother plants" for spore production. These were inspected closely with much discussion of naming technicalities.

This collection covered a greater range than their commercial nursery list, reflecting the difficulties of mass producing certain taxa. For example, *Asplenium septentrionale* and *Polypodium vulgare* agg. 'Cornubiense' were pleasant surprises here.

All too soon we had to move on. Our next visit was near Aalsmeer at the nursery of Wim Braam. We arrived just before lunchtime, yet our host made us most welcome, showing us acres of fern prothalli all looking remarkably healthy. As at Lemkes, the plants in production at the time were all tender species, but there were a few hardy ferns in one corner. Unfortunately the hardy fern mother plants were not kept at the nursery, but the stock plants of the tender species were on site. They made a truly magnificent sight, greatly enhanced by numerous plants of a tree-fern, probably *Cyathea cooperi*. Sadly Wim only grows tree ferns for pleasure and does not envisage mass production. Tender fern production here is probably similar to the Lemkes output, but Braam's produce a more restricted range of hardy ferns - some 40 of the more popular taxa at the moment. However, the full colour nursery catalogue produced by Wim Braam is the best I've ever seen, and of more use than some published books!

After such a fascinating morning, it was a real pleasure to mull over our experiences with a late lunch in excellent company at a nearby restaurant which overlooked a huge freshwater lake.

There was no time to linger. After lunch we rushed off to the Royal Eveleens nursery near the famous auction rooms at Aalsmeer. Production here was mainly aimed at tender



Fig. 1 - Part of the hardy fern collection at Leiden Botanic Gardens.

ferns, but it was most interesting to learn about some of the problems of mass fern production. By this time my wife and I were beginning to wilt, but a refreshing cup of tea in the Royal Eveleens board room came to the rescue. While we were relaxing, the 'phone rang. It was Bert Hennipman suggesting we drive over to yet another nursery and meet him there.



Fig. 2 - Nederlandse Varenvereniging plant exchange. [Helmut Schmick: third from left - Johan Eek: sixth from left - Jan Greep: far right, background].

We shot off, passing through some very attractive residential areas where, incredibly, virtually every garden included some ferns, usually *Matteuccia struthiopteris*. Our target was Wim Tasse's nursery where, in collaboration with "Fern Select", he holds a marvellous collection of hardy ferns under trial for potential marketing. Here we saw some ferns rare in cultivation, most notably *Dryopteris lepidopoda*. We were shown around by Bert and Wim Tasse, but time was against us and we only saw a fraction of the whole nursery.

We had to rush off for our overnight stop with Bert at Bilthoven. I was not surprised, but very pleased to see a wonderful fern collection in his garden. A delicious dinner and a pleasant evening with Bert's family set us up for another big day.

We had to be in Leiden for the anniversary meeting organised by the Nederlandse Varenvereniging. At 10am the meeting started with a chat over coffee. With most of the nurserymen we had met the previous day present it was like meeting old friends again. At 10.30 we settled down for introductory comments by the Varenvereniging president, Johan Eek, before Helmut Schmick gave the first paper - "Ferns and their application". Although given in German, and translated on the spot into Dutch by Pieter Hovenkamp, neither my wife nor I understood much of the spoken word. But ferns is an international language and, because Helmut's talk was illustrated by many excellent slides taken in his garden, we still enjoyed it immensely.



Fig. 3 - Hazel Rickard and Harry Roskam discussing the hardy fern collection of 1594: *Dryopteris filix-mas*, *Polypodium vulgare*, *Cystopteris fragilis* and *Asplenium scolopendrium*.

Next on the agenda was the opening of the fern exhibition in the orangery of the Leiden Botanical Gardens. To accompany this exhibition an excellent book, *Varen, Varen, Varen* (Ferns, Ferns, Ferns) was launched. I believe this is the first

book on ferns produced in Holland in recent times. After several short speeches we had time to enjoy the exhibits before strolling back through the gardens to admire the recently planted hardy fern borders. Ferns were donated from many sources, but notably by Wim Braam and Harry Roskam, who will be known to many BPS members from his attendance at our 1991 centenary celebrations. This collection has to be one of the best I've seen in any public garden. The sheer quantity of ferns was almost overwhelming (Fig. 1). Common cultivars and species were represented by drifts of many plants, but some rare taxa were also on view, most notably several good *Polypodium* cultivars and an odd *Gymnocarpium*. It was found in the wild in France by Harry, and could be a hybrid between *G. dyopteris* and *G. robertianum*.

Over a buffet lunch, provided in the Botanic Garden, there was a chance to buy the book *Varen, Varen, Varen* and a pair of beautiful colour posters, one showing a typical fern life cycle using *Polypodium vulgare* as an example and the other illustrating the various technical terms used by pteridologists. At this stage there was also a plant exchange where members bring along spare plants and everyone just seems to help themselves. Several members had obviously brought plants along but one, the president Johan Eek, had some real treasures on offer, and I was very grateful to him for some interesting plants (Fig. 2).

After lunch it was my turn to give a talk on "Variation in *Polypodium*". It was quite an experience for me to have an interpreter, but it seemed to work well thanks to the skill of Pieter Hovenkamp, and we even managed a few amusing moments thrown in.

The next paper was given by Ronnie Viane on "Interesting ferns from Poros".

Unfortunately Ronnie gave this in Dutch, and since he'd given a similar talk during the BPS excursion to Central France in 1993, Hazel and I decided to tour the fern collections instead. Here we were very lucky, as Harry Roskam decided to miss Ronnie's talk to give us a guided tour of the gardens (Fig. 3). This included a look behind the scenes at fern propagation and the reconstruction of Clusius's original garden, including six ferns cultivated here at the end of the 16th century (Fig. 4).

Following tea there was a discussion (in Dutch) on where the Dutch fern society will go from here. Finally it was back to the orangery for wine and cheese to finish a very successful day.

To have been a guest of the Nederlandse Varenvereniging for these two days was a wonderful experience. Although the schedule was complex, everything went smoothly. The programme was varied and very interesting. The society, and Jan Greep in particular, are to be congratulated on a very successful meeting which was exceptionally well organised. I thoroughly recommend the Botanic Gardens in Leiden to any member travelling through Holland. Who knows, you might even be lucky enough to meet Harry Roskam there.



Fig. 4 - Ferns represented in Clusius's original collection of 1594.

THE ECOLOGY AND CONSERVATION of SCOTLAND'S RARE FERNS

A summer meeting of the Society was organised under this title by Stuart Lindsay, Adrian Dyer, Heather McHaffie and Chris Page. It was based at the Royal Botanic Garden Edinburgh (RBGE) and lasted four days from Thursday July 28 to Sunday July 31, 1994. The first two days consisted of lectures, guided tours and demonstrations at RBGE and the second two days were occupied by a field trip with an overnight stop near Aviemore. An outline account by Margaret Nimmo-Smith of the programme at the Botanic Gardens and a record of the field trip written by Peter Edwards was published in the Bulletin, Vol. 4 (No. 5) pages 200-208. Here we are presenting edited highlights of each paper given at RBGE.

Adrian Dyer and Stuart Lindsay

WELCOME AND INTRODUCTION

Dr. David Mann, Deputy Director, RBGE.

Welcome to the Royal Botanic Garden Edinburgh and its 70 acres of garden and glasshouse. As an algologist, my links with pteridology have been limited. The two main ones are an undergraduate Honours project on the pteridophyte flora of part of the Brecon Beacons, and, perhaps as a consequence of the experience gained during that project, my discovery about ten years ago of a new site for *Woodsia ilvensis* in the Cairngorms while leading a student field trip. This discovery demonstrates that it is still possible to find new localities for one of the most sought after and rare British ferns. The take-home message from this must be that even though the British fern flora is one of the best known in the world, there is much still to be done to fully document what grows where, let alone to learn the factors that determine that distribution. How is this work to be done?

With the Director, Professor David Ingram, I have to decide how our funds are to be spent on research at the RBGE. These funds are declining and, increasingly, their use is restricted by attached conditions. It is therefore essential that we have good information on scientific needs and priorities so that decisions can be made wisely and not arbitrarily. This points to a role for societies like the BPS (British Phycological Society as well as British Pteridological Society!). They must be pressure groups and sources of information for their subject areas, providing informed opinion to botanical institutes and to the paymasters of research and conservation activity. These paymasters are civil servants but behind them are politicians and behind them are the public. We need to convince all of them that there is worthwhile, relevant, achievable work to be done and then we must make sure that we are equipped to do the work well and deliver the results in the form required. The BPS must try to co-ordinate this activity and seek every opportunity to get the right message across to those who form opinion and make decisions at local, national and international levels. This meeting is one such opportunity, a forum for exchange of information, discussion of new initiatives and promotion of co-operation and integration.

PTERIDOLOGY AT RBGE - THE PAST

Dr. Chris Page, RBGE.

The Royal Botanic Garden Edinburgh has played a central role in the history of pteridology in Scotland. Scotland has a relatively rich fern flora and Edinburgh provides a good centre with access to a variety of fern-rich habitats. This was first appreciated during the Victorian "fern craze" of the 1850's onwards when the newly built railways provided

many more people with the opportunity to travel to and within Scotland on fern excursions. At that time, pteridologists did not merely survey the flora but also collected it. As a consequence, the RBGE has an excellent herbarium collection but unfortunately many of the more local populations, like the *Woodsia ilvensis* colonies in the Moffat Hills, were largely eliminated. The interest also resulted in the propagation and cultivation of hardy and tropical fern species from all over the world for public display at the RBGE and other Botanic Gardens. An impressive example of a "fernery", the Kibble Place, survives at Glasgow Botanic Garden. For some pteridologists, the fern craze involved a passionate interest in unusual variants found in the wild and then propagated and further selected as horticultural varieties. A surprising amount of spectacular variation was found in a very short time and many gardens, including the RBGE, maintained a collection of these varieties but most have since been lost.

In parallel with the interest in fern growing, there developed a curiosity about the scientific aspects of pteridology. This grew, as did the RBGE itself, out of the interest in the medicinal use of plants. In the late 1700's, John Lindsay was a medical student studying under Dr. John Hope, Professor of Botany and *Materia Medica* in the University of Edinburgh, King's Botanist in Scotland and Superintendent of the Royal Garden. Lindsay subsequently sailed as a ship's surgeon to Jamaica where he then lived for some years. There he noticed that young fern plants appeared wherever earth had been exposed and then left shaded and untouched for a few months. He investigated the cause of this by observation and experiment. Under the microscope, he observed and recorded the germination of the spores to form "bilobate liverwort-like scales", (the first description of prothalli), and later "a small membranous leaf". He sent his account to Hope for presentation to the Royal Society of Edinburgh but Hope's death intervened. In 1789, Sir Joseph Banks wrote from Kew to ask Lindsay to send live ferns from Jamaica. Lindsay replied that he did not think that plants would survive the journey but that he could send "seeds" (spores) and sent a copy of his notes on development from spores. These then appeared exactly 200 years ago in the Transactions of the Linnean Society for 1794 (Vol. 2, 93-100) as the first published description of stages of the fern life cycle.

Scientific pteridology, starting as a study of the life cycle in cultivation, can thus be said to have emanated from the University and Garden at Edinburgh. Not only does the tradition of growing ferns from spores from all over the world continue at Edinburgh, as at Kew and elsewhere, but so also does the link between the Royal Botanic Garden and the University. My work on the sporophyte generation, since I was appointed as the first pteridologist at the Garden in 1970, complements the research on gametophytes of Adrian Dyer, who joined the University Botany Department in 1960. Our combined interests in the two phases of the life cycle led in 1983 to the First International Symposium on Pteridology (*The Biology of Pteridophytes*), held at the RBGE, the University and the Royal Society of Edinburgh. This co-operation has continued until the present, and over this period the link between the name Lindsay and Scottish pteridology was revived when Stuart Lindsay, also a graduate of Edinburgh University, joined us to carry out research on the ecology of the life cycle of rare native ferns.

PTERIDOLOGY AT RBGE - THE PRESENT AND FUTURE

Dr. Chris Page, RBGE

The RBGE is now the main focus of pteridology in Scotland and has several collaborative projects with conservationists, ecologists and palaeobotanists from other organisations. In addition to the continuing fundamental activities of a botanic garden, such as critical taxonomic authentication, maintenance of living and herbarium collections, and provision of expert advice on distribution and ecology, there are currently four areas of more specialised activity which are likely to remain important in the future as environmental awareness increases.

1 Studies of indigenous Scottish pteridophytes.

The British fern flora with about 100 taxa is depauperate (compared with Japan, which is similar in area, latitude and isolation but has about 2000 species) as a result largely of the effects of Pleistocene glaciation. However, there are compensations. The British pteridophyte flora is actively re-creating diversity to fill the empty "evolutionary canvas" of the wide range of habitats to be found, especially in Scotland. The high hybrid:species ratio in several genera is a reflection of this activity. Hybridisation is an important step in pteridophyte speciation and the relatively small flora of Scotland provides an opportunity to study more easily the formation and ecology of hybrids, and thus learn about the evolutionary process. The Scottish climate is relatively severe but this has the advantage of producing a wide range of habitats from alpine to atlantic maritime. Studies are continuing on *Equisetum* hybrids, *Diphasiastrum alpinum* and its putative hybrids, the *Cystopteris fragilis/dickieana* complex, and the neglected and taxonomically unclear alpine *Athyrium* species, amongst others.

2 Studies of pteridophytes from within or outside Scotland for which Edinburgh provides the necessary expertise.

Bracken: Recent research has revealed bracken in Britain to be more diverse than previously appreciated. The specific and infra-specific taxonomy and evolution of British bracken, including the distinctive northern bracken of native pine forest, is being re-assessed in the context of bracken world-wide.

Equisetum: Taking advantage of the fact that Britain has more *Equisetum* species than anywhere else, the genus is being studied from a world and fossil perspective using Scanning Electron Microscopy to reveal new micro-morphological characters.

Selaginella: Initial observations on megaspore dispersal in *Selaginella selaginoides* reveal a new mechanism that requires further examination. All four spores in each megasporangium are propelled several feet, two by compression followed by two ejected by a slingshot action. As this species is of the "primitive" group with isomorphic leaves, this mechanism might be traceable back to a Carboniferous origin. It does not occur in more recent species with heterophyllous leaves; these eject the microspores rather than the megaspores.

Such knowledge of the bio-ecology of living pteridophyte species can thus help to make inferences about the environment of fossil species, especially in Tertiary times when ferns were widespread.

3 Provision of an information source on Scottish pteridophyte conservation.

RBGE is increasingly active as an information resource for specific pteridophyte conservation issues within Scotland. Expert advice is available on several aspects including the great changes in pteridophyte diversity which have resulted from changes in land use by both agriculture and forestry. One fern, bracken, has itself destroyed habitats for many other native species of plants and animals as its spread was promoted by over-grazing and excessive burning.

Two approaches which have been particularly developed in Edinburgh in recent years are likely to attain wide significance. The first concerns the appreciation of the value of certain fern species as environmental indicators. For example, in Britain, the occurrence of *Phyllitis scolopendrium* in an otherwise acidic area is likely to be due to the presence of old mortar, and *Phegopteris connectilis* and *Gymnocarpium dryopteris* are important as indicators of ancient woodland. *Hymenophyllum* and *Ophioglossum* are associated with long-undisturbed habitats, while *Osmunda regalis* reveals the absence of grazing. More recently, it has been shown that natural soil spore banks occur for many species, and these have considerable conservation potential.

4 International pteridophyte conservation

RBGE is expanding its role in the conservation of overseas ferns, targeting in particular

endangered temperate floras and oceanic islands of high natural endemism. The newly established Edinburgh Spore Bank provides low-temperature storage conditions to increase the longevity of spores and provide a "gene-bank" of rare species from an increasing list of sources. In conjunction with the Spore Bank, *ex situ* cultivated populations of several rare temperate species are maintained as conservation collections in the gardens at Edinburgh, Dawyck, Benmore, Logan and in west Cornwall. In addition, the Mauritian Rare Ferns project, funded by the Darwin Initiative, aims to train Mauritians in fern propagation and conservation techniques in order to ensure the survival of endangered species endemic to Mauritius.

APPROACHES TO CONSERVING RARE FERNS IN SCOTLAND

Mr. Phil Lusby, Rare Plants Project, RBGE.

Long term conservation of rare plants depends on a multi-angled approach including education, taxonomy, population monitoring, ecological and biological research and horticulture.

Conservation relies ultimately on the interest and support of the public, including landowners and land users. The attention that ferns received during the Victorian "Pteridomania" had negative as well as positive consequences. The positive consequences included a greater understanding of propagation methods, recognition of valuable taxonomic characters, awareness of hybridisation, and an increased appreciation of fern beauty and diversity. Negative consequences included frenzied collection of rare species and unusual variants. Now there is a more enlightened attitude to collecting but there is a need once more to draw attention to the diversity of British pteridophytes. National Botanic Gardens can provide living reference collections which can do much to encourage appreciation and assist identification. Increased understanding of most species is accompanied by a greater concern for their well-being. Collections of British species are being established at the RBGE and its specialist gardens at Benmore and Dawyck and also in Cornwall. The Scottish Rare Plant Trail at RBGE includes most of our Scottish threatened species.

Major roles of taxonomy in conservation are to draw attention to recent discoveries and to recognise rare taxa. However, differences of opinion about taxonomic rank can cause problems because legal protection under Schedule 8 of the Wildlife and Countryside Act (1981) has not been provided for a rare subspecies or variety if a commoner subspecies or variety also occurs in Britain or if taxonomic debate persists, as for *Athyrium distentifolium* var. *flexile*/ *A. flexile*. Thus there may be a temptation to elevate threatened rarities to species level to increase protection. Where there is debate about the taxonomic status of a rarity, a consensus by taxonomists regarding its biological importance would help those conservationists faced with the difficult task of selecting plants for legal protection. The assignment of a taxon to an infra-specific rank reflects a close relationship to other taxa, and is not an admission of lesser biological significance.

In order that monitoring shall provide the information required, the aim must be clear from the outset. Monitoring ranges from checking that the species still exists at a site to a demographic study involving ecological research into recruitment, growth, reproduction and death of individuals. The more detailed and expensive studies give early warning of subtle changes in age structure. Less detailed monitoring, involving, for example, mapping plants on location photographs or accurately locating individuals in permanent quadrats or plots, is useful in detecting more obvious changes.

While *in situ* conservation is always preferable, pressure on habitats means that maintenance of *ex situ* collections as a gene bank, and for research and reintroduction,

is frequently necessary. Cultivation of plants provides horticultural information which will benefit attempts at reintroduction while spore storage provides a convenient way of preserving a wide range of genotypes. An *ex situ* low-temperature spore bank for British and world rarities has recently been set up at RBGE but more research is required into the effects of storage conditions on spore longevity. Regeneration by controlled disturbance of natural soil spore banks *in situ* offers a potential alternative to labour-intensive translocation of *ex situ*-raised plants at sites where rare species have been destroyed.

Discussion. For conservation legislation to work, the public and particularly the law makers must be convinced of the credibility of the professional judgement in selecting and defining the plants to be included. To avoid the complications created by limiting protection to species, we need to be able to identify rarities regardless of rank and get them scheduled. These rarities will include subspecies and varieties and even hybrids, some of which will be incipient species, the building blocks of future evolution. Indeed, in terms of conservation, it may be wiser to abandon ranking of taxa within a species as there have been persuasive arguments that taxonomic varieties are more likely to be incipient species than are subspecies. Infra-specific taxa, whatever their present rank, should be considered for protection even when the species is common outside Britain, provided that the British form is genetically distinct, as they frequently will be because our geographic position results in a flora which includes several geographical elements at their climatic margins. In Pennsylvania, USA, recommendations on conservation regardless of taxonomic status are made on the basis of a collective judgement by a committee of professional botanists. Anyone can petition this committee for protection for a rarity and the committee's decision is then embraced by the legislation. Where there is uncertainty about the taxonomy, habitat or abundance, plants can be included for 5 years under an informally recognised "tentatively undetermined" category pending further research. In Britain, the Wildlife and Countryside Act is under review and attention will be given to the question of extending coverage to subspecies. However, if protection is to be effective, it must be possible to prove that the subspecies can be identified from all others and so only plants which are sufficiently distinct should be scheduled.

SOIL SPORE BANKS AND CONSERVATION

Dr. Stuart Lindsay, RBGE and University of Edinburgh.

About 10% of the world's 13,000 fern species are threatened with extinction. Wherever possible, conservation should be attempted *in situ* but frequently *ex situ* procedures are necessary as alternative or additional measures. Ferns can be brought into *ex situ* conservation as sporophytes, gametophytes, fresh spores or as soil spore banks (reservoirs of live spores buried in the soil). Sporophytes are easy to identify, long-lived in cultivation, and useful for education and display while providing a spore source, but are bulky and vulnerable in transport, expensive to maintain in cultivation and their removal depletes the population. Most gametophytes are difficult to find and identify and are short lived in cultivation, although the perennial gametophytes of the filmy ferns are more easily found and grown than are the sporophytes. Fresh spores have the advantages of being available in large numbers and easily transported, stored and grown, and for this reason a fern spore gene bank has now been set up at RBGE. However, the spores of many species, especially temperate ones, are only collectable during a short season, and the so-called "green spores", such as those of *Osmunda regalis*, are short-lived under conventional storage conditions. Because of the limitations of these sources of material, soil spore banks have some advantages.

Soil spore banks of ferns are widespread geographically, ecologically and taxonomically (including more than half the British flora). They invariably contain two or more species,

frequently including species not present in the immediate vicinity of the sample site, and are found to depths of more than 1m. Most spore banks are known to be "persistent", i.e. last for more than one year. The maximum longevity is unknown but is suspected to be several decades. Dry spores of certain desert species have survived for over 50 years on herbarium sheets, refrigerated spores live longer than those at room temperature (viability after 10 or 20 years is common), and we have discovered that spores stored wet maintain their viability much longer than those stored dry, even at room temperature. This is even true, at least over a more restricted time scale, of green-spored species.

These properties of persistent soil spore banks indicate potential advantages as a source of *ex situ* collections. Sampling can be undertaken at any time of year, storage and culture to obtain plants or a spore source is relatively easy (although it should not be assumed that the native soil that supported the parent sporophytes is necessarily the optimum medium for raising the gametophytes), there is no disturbance close to the wild plants and it uniquely creates the possibility of retrieving genotypes lost from a dwindling population, or even retrieving a lost population after a recent natural or man-made catastrophe. Theoretically, it provides a means of resurrecting a species that has recently become extinct. It also opens up new possibilities of *in situ* conservation. Controlled disturbance at the site might create the micro-habitats required to stimulate "spontaneous" regeneration from the native soil spore bank.

Application of this approach to British rarities depends on the existence of soil spore banks in these species. Recently we have tested eight species: *Asplenium septentrionale*, *Cystopteris dickieana*, *Dryopteris cristata*, *Gymnocarpium robertianum*, *Osmunda regalis*, *Thelypteris palustris*, *Woodsia alpina* and *W. ilvensis*. Soil samples from selected wild populations of each were brought back to the laboratory, sealed inside petri dishes over a layer of sand, and cultured. When gametophytes produced sporelings, they were transferred to pots and grown on until they were mature enough to identify. (In order to allow more rapid identification, a reference collection of British species is being grown to provide information for the eventual construction of an identification key to juvenile sporelings of British ferns). The rarities were then selected and maintained as conservation collections.

Soil spore banks have so far been confirmed for at least one site for seven of the species examined. These species are: *Asplenium septentrionale* (large spore bank, three Scottish sites); *Cystopteris dickieana* (no spore bank of any species detected at the type locality, perhaps due to high salt content, but similar material abundant in spore bank with other species at nearby site); *Dryopteris cristata* (recently extinct in Scotland but obtained from spore banks from East Anglia); *Gymnocarpium robertianum* (large spore bank found at the only, very small, Scottish locality and from two large populations near the Lake District); *Osmunda regalis* (a small spore bank detected even after two years in samples from East Anglia even though spores are green and reputedly short-lived); *Thelypteris palustris* (large spore bank in several samples from East Anglia); *Woodsia alpina* (plants obtained in considerable numbers from soil samples from two Scottish populations and these plants in turn yielded abundant spores in under a year). For one species, *Woodsia ilvensis*, we have not yet been able to confirm the presence of a persistent spore bank at any of the three sites (2 in Scotland and 1 in England) sampled. Gametophytes appear in culture but are difficult to raise to sporelings on their native soil and none have yet been firmly identified as *W. ilvensis*. We plan to use isozyme "finger-printing" to test for *Woodsia* among the gametophytes and to investigate the effects of environmental conditions on sporeling establishment from spores.

One of our further aims is to extend this approach to overseas species which are globally threatened. Our first attempt at this has involved sampling at sites for two Macaronesian endemics, *Adiantum reniforme* and *Asplenium hemionitis*, on Tenerife. We are still

awaiting results for the latter, but success with the former indicates that a similar approach should be employed with its critically endangered close relative *Adiantum asarifolium*, one of the target species in the Mauritius Rare Ferns Project recently established with Darwin Initiative funding at RBGE.

Discussion.

Despite the potential longevity of fern spores, spores from old herbarium sheets are unlikely to be a reliable source of plants from long extinct populations of rare species because of storage conditions, chemical treatment of herbarium specimens and contamination by spores from other sheets.

THE POST-GLACIAL HISTORY OF SCOTLAND'S RARE FERNS

Heather McHaffie, University of Edinburgh.

About 14,000 years ago the ice, which at times during the previous Ice Age had covered even the mountain tops of Scotland, began to retreat as the temperature rose. This created large areas of base-rich moraine, available for colonisation by plants. Some idea of the flora of the period can be obtained by identifying the fossil pollen and spores deposited at that time and now retrieved from the bottom of peat bogs or old lakes. A similar picture is obtained by recording the present flora of similar habitats in, for example, Iceland. The pteridophytes present in this open, tree-less, landscape included *Botrychium lunaria*, *Ophioglossum vulgatum*, *Cystopteris fragilis* and *Selaginella selaginoides*. Where the ground-water was rich in silica, *Equisetum* species, such as *E. variegatum*, would have flourished. A brief colder phase between 11,000 and 10,000 years ago resulted in development of tundra in which species now recorded as arctic-alpines, including *Woodsia ilvensis* and *Diphasiastrum alpinum*, would have been widespread.

Although there were climatic oscillations, over the next 5,000 years it became generally warmer and drier. Trees established, initially juniper, willows and tree birches (as distinct from the dwarf birches of the tundra). Some of the previously abundant pteridophyte species, such as those mentioned above and *Cystopteris montana*, *Dryopteris oreades*, and *Equisetum pratense*, would have become more localised, as would the snow-patch species *Athyrium distentifolium* and *A. flexile*. These species are now all restricted to montane areas. The lower ground would have been very wet 10,000 years ago and *Osmunda* was abundant. In the widespread mineral-rich fens, *Thelypteris palustris* also thrived. As the larger trees established, hazel was initially abundant because of the basic soils. Pine appeared about 8,500 years ago and at about that time some soils began to be more acid as a consequence of leaching, and *Calluna* became more common. Bracken, perhaps including *Pteridium pinetorum* although this cannot be confirmed from the fossil spores, became more common as a plant of forest clearings. *Lycopodium annotinum* was very abundant 8,000 years ago, with pine and juniper; it is still found in pinewoods, even plantations, although it has declined significantly in recent years. *Lycopodium clavatum* was also present, probably in *Calluna* as now, but there was no open moorland, and heather, though increasingly common, was still limited to forest clearings.

By 6,000 years ago, the temperature was warmer than now but the climate had once more become wetter. As a result, large areas became acidic through leaching, and peat formation increased in area and depth. Stumps of the early pine forests can be found buried under many feet of peat. Base-rich habitats were restricted, as now, to the vicinity of exposed and eroding basic rocks such as mica schist. Species we now think of as "western", like *Hymenophyllum wilsonii*, would then have been much more widespread.

It was at about this time that man also began to have some effect on the frequency and distribution of pteridophytes. As conditions became cooler and drier, man began to clear the forest for grazing land and for cultivation. Some pteridophytes would have benefited

from this. Where grassland developed in the ever-expanding forest clearings, new habitats for *Ophioglossum vulgatum* would have resulted. Where cultivated land was abandoned, bracken often invaded before trees could re-establish to shade the bracken out. Other pteridophytes were adversely affected by the increase in agricultural activity. *Isoetes* appears to have been temporarily eliminated from lochs where it was buried under silt washed in from surrounding disturbed and eroding hillsides, and this still happens.

Early cultivation was restricted to the lighter soils on high ground. By 2,500 years ago, when the cool, wet climate was the same as now, the gradual taming of the landscape was visible as cultivation terraces, still detectable today in some places. In mediaeval times, natural habitats were further reduced as cultivation moved into the lower ground. To overcome the problem of poor soil drainage, the runrig or ridge and furrow system was widely used until superseded in the 18th Century by underground field-drains. This agricultural improvement, which has continued until the present, has resulted in the marked reduction of wetland habitats and the once abundant species, such as *Dryopteris carthusiana*, that inhabited them.

In at least one instance, however, draining may have been beneficial. *Thelypteris palustris*, now very rare in Scotland, was recorded last century from several lochs which were drained in the late 18th Century to remove the buried post-glacial deposits of base-rich marl. Exposure of the marl would have re-created the immediately post-glacial environment favoured by *Thelypteris*. A few other species also benefited from man's activities. For example, *Polypodium* and, in particular, *Asplenium ruta-muraria*, took advantage of mortared walls. *Equisetum arvense* was well equipped to exploit disturbed ground.

Almost every habitat has been managed or altered by man. Some of the adverse effects on pteridophytes could be controlled. Fortunately, over-collecting, the cause of serious decline and even local "extirpation" in, for example, *Cystopteris dickieana*, *C. montana*, *Asplenium septentrionale* and the *Woodsia* species, is already prohibited. Excessive grazing by goats or deer, which restricts species like *Athyrium distentifolium* to inaccessible ledges, could be prevented with beneficial consequences. Necessary disturbance, for example grazing and trampling to maintain the open wetland habitat of *Lycopodiella inundata*, could be maintained. The disturbed conditions required for our important populations of *Pilularia globulifera*, such as silty loch margins and excavated brick clay pits, could be provided. To be successful, any intervention will usually require more research-based information on the species biology.

Looking to the future, less intensive agriculture and "set-aside" might allow restoration of some wetland habitats. Climatic change will have effects, but they are hard to predict. Earlier springs with late frosts would damage frost sensitive species like bracken. A drier climate would discourage *Botrychium* and *C. montana*, for example, and several other species, like *Asplenium ceterach*, would spread from the south. Warmer conditions would threaten the alpine species. Increased rainfall would allow the eastward spread of species like *Dryopteris aemula* but perhaps put continental species like *A. septentrionale* at a disadvantage. As has been the case throughout the last 14,000 years, some species will decline and others will increase as conditions change. The rarities of one era become the common-place of a later one, and *vice versa*.

SETTING UP A MONITORING SYSTEM FOR WOODSIA IN THE WEST OF SCOTLAND

Mr. John Mitchell, ex-Nature Conservancy Council.

Although having had an interest in the genus *Woodsia* for a good many years, it was not until joining the Nature Conservancy Council (now SNH) in 1966, and subsequently

taking on responsibility for the Ben Lui National Nature Reserve in the mid-1970s, that I was able to put this interest to practical conservation use. Having quickly discovered that there was virtually nothing in the Regional Office file as to the precise locations of any of the reserve's rarer mountain plants, I gave some thought to devising a system of plotting the position of selected species, together with some rough and ready method of monitoring the performance of each colony.

Woodsia alpina seemed the most obvious species to start off with, and the project gave me a good feel for the type of habitat the *W. alpina* seemed to prefer - typically a weathered exposure of banded limestone or calcareous schist, with a distinct lack of any vigorous competitors. The four known *W. alpina* colonies on Ben Lui were photographed using a Polaroid camera, the position of each marked on the instant print there and then. Because I was unable to get a satisfactory answer as to the life expectancy of an instant print, a duplicate photograph was taken on conventional film. Later, the data from the field instant print were transferred onto the conventional archive print once the film was processed. As it was also essential that anyone attempting to monitor the reserves *W. alpina* colonies in future years could readily find the documented site, a large-scale map was marked and a distant photographic shot was also taken on instant and conventional films, the prints annotated as before.

Two developments led to the *W. alpina* survey on Ben Lui reserve being extended to all of its other known stations in the western highlands. First, both British species of *Woodsia* had just received legal protection under the *Conservation of Wild Creatures and Wild Plants Act* of 1975. From then on a much clearer picture of the national status of both *Woodsias* was going to be required by the Nature Conservancy Council in their role as advisors to the government. Secondly, in the mid-1970s much of Britain was in the grip of a summer drought, and the first warning grumblings of global warming were being heard. If global warming was to be a reality, what was going to be the effect of an increase in the average summer temperature on Britain's relict arctic-alpine flora and fauna? It was clear, even back in the 1970s, that a reliable baseline survey needed to be undertaken if meaningful assessments on changes in *Woodsia* populations in Britain were to be made in the years to come.

Let us take a look now at the monitoring system in practice using as an example a pretty well-known *W. alpina* site on the Perth/Argyll border. The background information collated included the site name, map reference, vice-county, altitude, direction of exposure, rock type, list of plant associates and, where known, previous recorded history. Every tuft of *W. alpina* at each site was allocated an identification number and marked on the photograph. As a rough guide to performance, the number of fronds on each accessible tuft was counted and a measurement taken of the largest frond. This is an exceptionally dry site with a southerly exposure and, with its potential for desiccation, it was found that the average number of fronds was only 8, with a maximum of 18 on the older, larger plants. Fronds reaching 3.5 inches in length were few and far between.

Not all the *W. alpina* sites in the western highlands are as impressive looking as those on Ben Lui, a rather nondescript hill, which is probably why it was overlooked by the Victorian fern collectors. At this site I found it was just not practical to document each *W. alpina* tuft as before - for once there were just too many of them! In this case the rock faces were given an identifying letter, and little more than a count made of the number of *W. alpina* on each of them. In 1990 my successor to Ben Lui NNR, Andrew Campbell, assisted by a small team of observers working in rather better weather conditions than I had endured 13 years earlier, counted no fewer than 340 tufts concentrated in this section of the hill alone. As I had found as well, there were some luxuriant plants amongst them too, with as many as 40 fronds, occasionally up to 5 inches long. This is most certainly the finest individual colony of *W. alpina* remaining in Britain today.

In 1977-8 this photographic monitoring technique was also applied to the two known surviving colonies of *W. ilvensis* in the Moffat hills of southern Scotland, again to establish a baseline to assess future changes in the fortunes of these even rarer British fern. My colleague, Dr Vincent Fleming, takes up the *W. ilvensis* story.

WOODSIAS IN SCOTLAND

Dr L. Vincent Fleming, Scottish Natural Heritage

John Mitchell has described the photographic monitoring techniques that he established for selected colonies of both *Woodsia* spp. My aim is present some of the results obtained from that monitoring, to provide an assessment of the current status of both species and to discuss potential conservation action.

Overall, there would appear to be no more than 95 known clumps¹ of *W. ilvensis* surviving in the wild in Britain compared to at least 1000 known clumps of *W. alpina*. Over 99% of the latter occur in Scotland compared to only 25% of *W. ilvensis* clumps. *W. ilvensis* is now restricted to only five localities in Britain (three in Scotland) with 9 sub-colonies. At least 35 sub-colonies can be identified for *alpina* within close to 20 broad localities. Nevertheless, most colonies are small with all but one *W. ilvensis* colony below 10 clumps and most *W. alpina* colonies below 20 clumps. Three colonies (one of *W. ilvensis*, two of *W. alpina*) hold the bulk of the *Woodsia* population in Britain. However, the small size of most colonies, even of the more abundant *W. alpina*, means that most of these are likely to be vulnerable to extinction through demographic and stochastic factors alone.

It is impossible here to present all the monitoring results but I will present data for three colonies of *W. alpina* before discussing the present status of *W. ilvensis* in the Moffat Hills. The *W. alpina* sites were monitored in 1977, 1985 and 1994. All populations were remarkably stable between 1977 and 1985 but all have subsequently increased. In two of the colonies this increase has been due solely to recruitment with no apparent mortality, all the clumps from 1977 still being present in 1994. In the third colony, however, despite an increase from 8 to 10 clumps over the recording period, only three plants were common to both 1977 and 1994. The increase here then, has involved five mortalities and seven new recruits indicating a more dynamic turnover than may have been suspected. These results indicate the value of this monitoring technique because it enables us to follow the fate of individual clumps and, therefore, to begin to determine important parameters of population biology such as longevity and recruitment. This information cannot be obtained from simple counts alone.

Monitoring alone cannot tell you why any changes in a population have occurred. However, it is noteworthy that both 1977 and 1985 were preceded by years of severe drought. Both *Woodsias* seem vulnerable to water stress and it is likely that both colonies were then at a low ebb as a result of this. In recent years, summers in the western Highlands have been more typical (that is much wetter) and the populations may have recovered accordingly. What is less clear is if some of the apparent increase is due to plants that were present on earlier visits (but which were then desiccated and not recorded) but have subsequently recovered. Regardless, despite this limited evidence of some small increases, there is no room for complacency in the conservation of *W. alpina*.

The Moffat Hills of southern Scotland are one of the classic haunts of *W. ilvensis* in Britain but from which they were thought to have been extirpated by collecting soon after the turn of the century. Subsequently, two small colonies were re-discovered, one by DA Ratcliffe in 1954 and the other by M Rickard on a BPS excursion in 1972. This last colony seems to have remained stable at 2 clumps from its discovery through to 1985². However, the first discovered and larger colony is in evident steep, linear decline. From the 25 clumps present in 1954 only three now survive; if current trends continue the colony has an extrapolated extinction date of 23 October 1995! It is clear from monitoring that there has

¹ Clumps is used in preference to plants since it is usually difficult to distinguish the individual plants within a clump or tuft. ² A site visit in 1994 established that only one clump now survives at this colony.

been no recruitment of *W. ilvensis* plants to the colony since 1977. The three clumps that survive today³ are, therefore, at least 18 years old but may be older still. This downward trend in the population is clearly cause for concern with local extinction a possibility for a second time!

Some factors that may have contributed to this decline include:

i) collecting - despite legal protection the species may still be vulnerable to this threat, yet there is no recent evidence of this from Moffat and some surviving plants are in readily accessible locations; **ii) rockfalls** - comparison of site photographs indicates that rockfalls from these crumbly, treacherous cliffs could have only accounted for the loss of single clump; **iii) loss of genetic variability** - the former massive collecting pressure may have forced the population through a genetic bottleneck leaving surviving plants vulnerable to, for example, inbreeding depression; **iv) drought** - the two recent drought years (1976 & 1984) may have taken their toll. However, in 1992 a summer visit revealed only one dried up *W. ilvensis* clump, but a subsequent visit following late summer rainfall found three clumps in the same locality indicating some ability of plants to recover.

Although the plants are on crags that may be grazed by feral goats we have seen no evidence that grazing damage occurs.

What should we do about such a decline? Should we continue to monitor to extinction or should we intervene to prevent this. If so, what action should we take? An immediate and urgent first step must be to capture as much of the existing genetic variation as possible by establishing *ex situ* collections, whether of spores or cultivated plants. This would provide a safeguard against extinction as well as material for research needed to guide future conservation policy. Plants could also be provided to enable re-stocking of existing colonies, if appropriate, and to restore *Woodsia* to sites from which it has long been absent. In doing so, we may have to consider whether we only use genotypes native to the site or whether, more controversially, we mix genotypes between colonies to restore genetic variability (if indeed that is part of current problems). *Woodsia ilvensis*, as an Arctic-alpine relic, may ultimately be threatened with extinction in Britain as a result of global warming but the proximate threat is clearly a legacy of the Victorian fern craze. In such circumstances it seems only reasonable that we intervene both to maintain and restore populations.

TEMPERATURE AS A FACTOR DETERMINING THE DISTRIBUTION OF *ASPLENIUM SEPTENTRIONALE* IN BRITAIN

Dr. Adrian Dyer, RBGE and University of Edinburgh.

When we talk about the ecology of British ferns, we are really talking only about the distribution of the conspicuous sporophytes described in relation to major features of the macro-habitat: latitude, altitude, moisture, shade, soil type and pH etc. We know very little about the factors determining those distributions.

I want to show how investigation of aspects of the growth and reproduction of a fern can help to explain its distribution, particularly for rare, local species or those with a very specialised and restricted habitat. This involves investigation of the other phases of the life cycle as well as the sporophyte.

As we have already heard, *A. septentrionale* is scarce and very local in Britain. This is only partly explained by the fact that it has been lost from some stations because of over-collecting in the past or by shading due to overgrowth by gorse or adjacent forest plantation more recently. The main reason for its local distribution is its restricted habitat; common features of its widely separated sites are dark-coloured volcanic or metamorphic rocks lacking calcium or other bases, such as slates, grits, granites and basalts, on

³ A sub-site of this colony, with a further 3 clumps, was discovered by John Mitchell in 1977. Because of the dangerous nature of the site, there have been no more visits to gather more recent information.

exposed, often south-facing, low to mid-altitude cliffs. On the rare occasions it is found on walls, they are mortar-free walls of the same rocks.

The localities suggest a requirement for a hard, base poor, substrate and a warm situation. This would explain its absence from the eastern half of Britain, dominated by sedimentary rocks, and from high altitudes in mountains, where temperatures are lower. Our results suggest a previously unsuspected explanation for this.

Our experiments were simple. We grew spores of several British species, including *A. septentrionale*, at a range of different temperatures to find the temperature requirements for germination. The spores were sown on nutrient medium and placed under artificial lights at controlled continuous temperatures. The percentage germination was then recorded daily until there was no further germination.

Asplenium septentrionale was unusual in that although the germination response at 20°C was similar to that of the other species, germination at 15°C was very slow and there was no germination at all at 10°C over the 9 weeks of the experiment. This confirms some earlier unpublished observations of Elizabeth Watt. The fact that temperatures of 15°C or higher, perhaps even close to 20°C, are necessary for full germination suggests that there may be very few sites in Britain where germination is possible.

Our spores were collected from a local population on Arthur's Seat; one of the nearest weather stations is at RBGE. Temperature records at RBGE for 1993 reveal that the maximum shade temperature reached 15°C or above on only 97 days per year (of 146 between 7.5.93 and 30.9.93) and never maintained a temperature of 15°C or above throughout the 24 hours. It reached 20°C only 9 times in total and presumably for only a few hours. For much of the year, perhaps all, the temperatures at RBGE are too low for germination and RBGE will be warmer than many places in Scotland.

Although we don't yet know the temperature requirements for growth and development after germination (we suspect they are lower than for germination), these temperature requirements for germination would alone be sufficient to restrict the species' distribution. What then is the adaptive advantage of this apparently restrictive requirement? Bearing in mind that this is a species with a continental distribution in Europe we would like to suggest that it is a mechanism for preventing germination during or just before the harsh winters and thus limiting development to the summers. The temperatures necessary for germination will be regularly achieved during the warm continental summers. This interpretation presupposes that the germination response recorded in British material is a species characteristic and not unique to British ecotypes.

We have obtained spores from southern Germany. Preliminary investigation confirms that this continental material also has the high temperature requirement for germination.

Thus, an adaptation related to the seasonal extremes at the centre of its geographical range in Europe imposes restrictions on its ecological distribution at the oceanic fringe of its range, in Britain, to sites that reach unusually high temperatures for long periods. Combined with its edaphic requirements, this restricts it to sunny rock faces in north and west Britain and is enough to explain its rarity.

Support for this interpretation comes from a similar investigation of *Asplenium ruta-muraria*, the Wall Rue. This is also a continental species and spores of British material also have a high temperature requirement for germination, with no germination at 10°C, and in one experiment, none at 15°C.

Again like *A. septentrionale*, we have looked at spores from southern Germany. These have the same temperature requirement for germination, indicating that again it is a

species characteristic associated with a predominantly continental distribution. It is interesting to note therefore that *A. ruta-muraria* in Britain is frequently found on south-facing surfaces. However, *A. ruta-muraria*, unlike *A. septentrionale*, is not rare in Britain. This is because it is a calcicole which can exploit not only the sedimentary basic rocks of south and east Britain in addition to calcareous rocks in the north, but also the lime mortar of walls all over the country.

This study illustrates the need for further autecological studies of germination and gametophyte development in other species. Without them, the distribution and habitat requirements of ferns can never be understood.

WHAT IS CYSTOPTERIS DICKIEANA?

Professor James Parks, Millersville University, PA, USA

The *Cystopteris fragilis* complex, including the variable species *C. fragilis*, is circum-boreal. In the 19th Century, a variant of *Cystopteris* was discovered near Aberdeen and later given the name *C. dickieana*. Material from the type locality is pretty distinctive. The stipe tends to lack the dark colour of *C. fragilis* (basally). Fronds, which are bright green, are fairly wide relative to their length and pinnae tend to be closely spaced and often overlapping. These distinctive morphological characters can be seen even on plants that have been maintained for years in cultivation. *C. dickieana* is also unusual (in the genus) in having non-echinate spores (often referred to as rugose). In recent years, this character has acquired high taxonomic importance and as a result, plants with fronds resembling those of *C. fragilis* but bearing non-echinate spores are being labelled '*C. dickieana*'. This practice raises taxonomic concerns in view of the fact that, at least in North America, spore morphology in *C. fragilis* is variable, sometimes even within a population. Partly for this reason, R.F. Blasdell, in his monograph of *Cystopteris* (1963), chose to demote *C. dickieana* to a variant of *C. fragilis*. Haufler and Windham (*American Fern Journal*, 81:7 1991) have recently reached the same conclusion, in part, using allozyme studies of North American *Cystopteris*.

In 1993, while on sabbatical in Scotland (and in collaboration with Adrian Dyer, Stuart Lindsay and Chris Page), I took the opportunity to investigate further the taxonomic status of *C. dickieana* using material from the type locality. The purpose of the study was (1) to determine if a set of multilocus allozyme phenotypes would distinguish the type population of *C. dickieana* and if so (2) would these allozyme phenotypes be found in other '*dickieana*' populations that had *fragilis* morphology and/or (3) would these allozyme phenotypes correlate with plants in other populations that had non-echinate spores.

We examined 5 naturally occurring populations:

- A** The type population of *C. dickieana* located in a cave near Aberdeen. All plants had typical *C. dickieana* morphology.
- B** A population near the type locality for *C. dickieana* containing some plants with frond morphology typical of *C. dickieana* and others with frond morphology more like *C. fragilis*.
- C** A population 150 km south west of Aberdeen containing plants all of which looked, to us, more like *C. fragilis* than *C. dickieana* (though we knew from Dave Tennant that at least some had previously produced non-echinate spores).
- D** A population 20 km from C (above). All plants had frond morphology typical of *C. fragilis*.
- E** A population near Perth. All plants had frond morphology typical of *C. fragilis*.

At each site we collected one fertile frond from each of 30 to 70 plants. A sample of each frond was subjected to isozyme analysis [A fairly complicated but standard protocol whereby one can genetically fingerprint individuals by determining the forms of proteins that each contains] and spores were examined by light and electron microscopy.

Each multilocus phenotype was assigned a number (1-20) in the order in which they were discovered. Each population had a unique set of allozyme phenotypes except for A and B which shared the same 2 multilocus phenotypes. The only allozyme phenotype recovered from more than one population (with the exception of A and B) was allozyme phenotype No. 3 which was found in C and D. Interestingly, the spore types of this allozyme phenotype differed in populations C and D. The four plants from C exhibiting it all had rugose spores whereas the one plant from D had echinate spores. Only population C had more than five allozyme phenotypes (13 in total were recovered).

Allozyme phenotypes and Spore Types in Scottish *Cystopteris* Populations

Population	A	B	C	D	E
Phenotypes present	no. 1 no. 2	no. 1 no. 2	nos. 3-15	no. 3 nos. 16-19	no. 20
Total no. phenotypes	2	2	13	5	1
Spore types present	Rugose	Rugose & Smooth	Rugose & Echinate	Echinate	Echinate
Total no. individuals	31	67	34	31	6

We were interested to discover that in population B, 9 out of 55 fertile plants bore spores that were neither rugose nor echinate, but smooth. Jermy and Harper (British Fern Gazette, 1971) have previously observed this third spore type in other Scottish populations. Population C which exhibited the greatest array of allozyme phenotypes also exhibited two spore types, rugose & echinate.

Discussion and Conclusions

Three spore types (echinate, rugose and smooth), were observed in this study of *Cystopteris*. Two spore types were recovered from within two populations. We could not predict from frond morphology the spore type of a plant. The allozyme phenotypes recovered indicated that much more variability exists between populations than within them. On the basis of these allozyme phenotypes, the type population of *C. dickeana* is no more than a distinct populational variant of *C. fragilis*. While there was some correlation between allozyme phenotype and spore type in population C, this same correlation did not exist in other populations. In brief, we found no overall correlation between frond morphology, spore type or allozyme phenotype among the populations examined.

The taxonomic status of variants within the widespread and variable species *Cystopteris fragilis* remains questionable. Vida (1974) demonstrated that *C. dickieana* from the type locality was reproductively isolated from a population of echinate-spores tetraploid *C. fragilis* from Eastern Europe, but nothing is known about its ability to interbreed with other

forms of the *C. fragilis* complex in Scotland. Berg (1992), in a recent study of Norwegian *C. fragilis*, found (as we did in Scotland and others did in N. America) populations with several spore types, but one frond morphology. Clearly, spore type alone is inadequate to delimit *C. dickieana*. Our allozyme study of Scottish *C. fragilis* found the same results as extensive work by Windham and Haufler in N. America: that allozyme phenotypes do not correlate with spore type or morphological variance. Our results lead us to concur with Berg and Windham and Haufler in questioning the status of *C. dickieana* as a species. With them, we believe a conservative treatment of variants in *C. fragilis* is warranted.

THE KILLARNEY FERN IN SCOTLAND

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The Killarney Fern *Trichomanes speciosum* Willd. is largely restricted to macaronesia and the Atlantic fringe of Europe reaching its northernmost extent in Scotland. It is very rare throughout this range. The species was first discovered near Bingley in Yorkshire (Ray, 1724) from where the sporophyte was last seen in c.1785 (Lees, 1888). This was to remain the only known British locality until the mid-nineteenth century, by which time the species local abundance and subsequent collection to near extinction at many Irish sites was well documented eg. Newman, 1844; Scully, 1916.

In Scotland *T. speciosum* was first found in Aug. 1863, on the east coast of Arran, near Corrie. The initial publication of this find (Babington, 1863) credited Mr. George Combe with the discovery, although he was shown the locality by the local 'walking postman' Mr. Robert Douglas (1864; 1887). Between them all traces of the plant were removed, the last "fragment of frond with an inch or two of rhizome" being taken from the already depleted site by Simson (1887), who successfully cultivated his spoils (specimens at E!). At much the same time another locality was discovered, on the mainland just North of Ardlamont Point (Landsborough, 1887). Again the discoverers, Messrs. Cook and Young, seem to have collected all the material present. Some, however, thrived in cultivation subsequently (Stewart, 1901). The third Scottish find was made by the palaeobotanist Robert Kidston in 1876, on the west coast of Arran, near Dougarie. He found just "three small and depauperate roots" one of which he removed to grow on (Landsborough, 1887). The following year a Miss MacBean literally stumbled upon the plant while walking near the Cock of Arran. The deep crevice responsible yielding upwards of a yard of rhizome and a dozen fronds (Stewart, 1901), but attempts to grow on bits were thwarted as it had lain in a dehydrated state too long. Then for almost a century the fern was believed extinct in Scotland, until refound on the Scottish coast in 1979 by Dr. Derek Ratcliffe, Carmen Placido and Peter Wormell, when 3 colonies were discovered during an N.C.C. vegetation survey.

Subsequently the fern was refound on Arran by Grace Small and Alice Sommerville (Sommerville, 1981; 1982) and since then 3 further colonies in two separate localities have been detected on the island by Tony Church (Church, 1990), one, perhaps that of Miss MacBean. While almost certainly gone from their original sites, some or all of the first Victorian discoveries may still be in cultivation but in the absence of documentation we may never know, although the development of molecular techniques gives hope that this may someday be resolved.

The discovery of the gametophyte generation of *Trichomanes speciosum* (Rumsey *et al.* 1990) has forced us to consider this species in a different light. By virtue of its ecology

and propagative ability the gametophyte can survive indefinitely in the absence of the sporophyte. Study has revealed gametophytes to be present over a much greater geographical range than the sporophyte in both the British Isles and most interestingly, Continental Europe (Vogel *et al.* 1993). In Scotland recent fieldwork has revealed gametophytes to be distributed scattered around the Scottish coast and inland in a Mid Perth. site where *Hymenophyllum wilsonii* just persists. These finds have extended the species northern limits over 300 km. Both generations appear to be restricted in Scotland to very low altitudes, often less than 20 m, rising on Arran to c. 120 m. As elsewhere in the British Isles maxima match those of *Hymenophyllum tunbrigense*.

The apparently anomalous distribution of the sporophyte and its possible post-glacial history were discussed by Ratcliffe *et al.* (1993). Discovery of the gametophyte has posed additional problems but may help elucidate this vexed question. An important factor is the consideration as to whether outlying gametophyte populations represent recent colonisation or the vestiges of a once wider range. Initial evidence suggests gametophytes disperse very poorly. Dispersal other than very locally is thus as with other ferns likely to be achieved by spores. *Trichomanes* is unusual in possessing green, thin walled spores which show no dormancy and very limited ability to withstand desiccation. They are also rarely produced - only one Scottish colony has ever been seen to be fertile and even in Macaronesia fertility in many colonies is irregular i.e. not annual. Rumsey (1994) estimated that the total British and Irish spore production over the last century could be exceeded by 10 *Dryopteris dilatata* plants in a single season! All available evidence suggests recent advance in range to be negligible. However, the question as to how spore dispersal readily occurred in the distant past, but not now remains to be fully answered.

So what is the future of *Trichomanes speciosum* in Scotland? Will there ever be a significant increase in the number of sporophytes? Sporophytic absence may be through failure in production or mortality once produced. Evidence from throughout the British Isles suggests archegonial production is a critical limiting step (Rumsey *et al.* 1992), these being markedly scarcer than antheridia. Data as to sporophyte production and subsequent survival are still limited but suggest a gradient from West to East, probably reflecting a combination of greater gametangial initiation and more conducive conditions for sporophyte survival in wetter, winter-warm areas. Examination of the species reproductive behaviour and success throughout its distribution suggests only subtle changes in macroclimate may have a profound effect on sporophyte recruitment. In Arran the species is generating new sporophytes and even the mature plants may have formed within the last 30 years. This is very encouraging for the species future in Scotland and may be evidence of change through climatic amelioration, however only a good base line survey of where both generations occur, regular monitoring for novel sporophytes and prevention of collection and disturbance will tell us.

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TWO APPROACHES TO THE TAXONOMY OF SCOTTISH BRACKEN

1: MORPHOLOGICAL AND PHENOLOGICAL CHARACTERS

Dr. Chris Page, RBGE.

Until a few years only one taxon of British bracken (*Pteridium aquilinum* subsp. *aquilinum* var. *aquilinum*) was widely recognised. However, in 1989, following a study of the morphological variation in that taxon, I concluded that we actually had 3 taxa in Britain (subspecies *aquilinum*, subspecies *atlanticum* and subspecies *latiusculum*). My most recent research, incorporating phenological observations, leads me to believe that in Scotland we should recognise at least 4 taxa: subspecies *aquilinum* var. *aquilinum*, subspecies *atlanticum*, subspecies *pinetorum* var. *pinetorum* and subspecies *pinetorum* var. *osmundaceum*. Subspecies *atlanticum* and the new subspecies *pinetorum* are described briefly.

Subspecies *aquilinum* var. *aquilinum*

Not described here.

Subspecies *atlanticum* (Atlantic bracken)

Like the common bracken, *atlanticum* is a tall growing, swamping plant. Its stem (rachis), however is twice as thick as those of Common Bracken and its croziers are thickly covered in white hairs. Consequently, pockets of this particular bracken are easy to spot early in the season amongst common bracken. Moreover *atlanticum* is much more upright, its fronds have more drooping-tipped pinnae, the pinna shape is somewhat different and the vernation is more indeterminate (i.e. fronds get taller as new pinnae are produced through most of the season). As far as I can see it is also restricted to limestone soils. So far, in Britain it has been found in the west of Scotland and in North and South Wales. It has not yet been found in England but I suspect that it might turn up in south-west England or the South Coast because in these areas there are all sorts of introgressions with it. I have also found herbarium material of the same taxon in Brittany, Central Spain and the Ivory Coast (West Africa). Clearly, it has an Atlantic distribution (hence its name) and a preference for warm climates.

Subspecies *pinetorum* (Northern bracken)

Pinetorum is a new subspecies (belonging to the widespread northern *latiusculum*

complex) into which I have put bracken taxa which have a preference for pinewood habitats in more northern cold climates (*Pinetorum* means 'of the pinewood'). In Scotland, I recognise 3 distinct forms of pinewood bracken but only 2 have names at present. All three forms are also united by the fact that their vernation is strongly determinate (i.e. all pinnae expand as the crozier unrolls and then no further growth occurs). This is an extremely fundamental difference which deserves taxonomic recognition. Also, all the Northern brackens are more frost tolerant than either *aquilinum* or *atlanticum* and the skeletons of dead fronds remain standing over winter.

1. *Pteridium aquilinum* subsp. *pinetorum* var. *pinetorum*.

Variety *pinetorum* (the type material), grows in the Rothiemurchus pinewoods of the Cairngorms, near Aviemore. It is extremely distinctive. It is a small low growing plant with an upright stipe, a rather steeply angled frond, a triangular (almost tripartite) frond, a coarsely cut blade (very leathery after full expansion), pinnae have very elongate ultimate segments, and in the spring the croziers are covered with red hairs. I have been able to match this material with herbarium specimens in Sweden, Russia and even China. [Worthy of brief mention at this point is that the Swedish herbarium material was that belonging to Linnaeus and to which he gave the name 'aquilinum'; the same name that is now widely used for the common (Southern?) bracken!. My colleague, Dr. Robert Mill (RBGE) is currently assessing the implications of this].

2. *Pteridium aquilinum* subsp. *pinetorum* var. *osmundaceum*.

The second distinct form of northern pinewood bracken that I found was on the moors above the surviving pinewood of the Black Wood of Rannoch, near Loch Rannoch. It looks totally different; It is much more upright than var. *pinetorum*, it has a coarsely cut blade, it is very leathery, its colonies are very sparse and its fronds have ultimate segments that are even larger and more elongate than those of var. *pinetorum*. Its pinnae tend to stand very upright but if you lay the frond out as a herbarium specimen you discover that the blade is also tripartite. This is the only form of Northern Bracken for which I have actually been able to find a valid name already in existence elsewhere in Europe. That name is *osmundaceum* and was first used by Christ in the 19th century to describe a similar 'Osmunda-like' bracken in Switzerland.

3. *un-named*

The third form of Northern Pinewood bracken which I recognise (but have not yet named) grows as local patches on the hillsides around Loch Faskally and Loch Rannoch. It is not yet named, since its affinities are not yet clear, having a peculiar morphology and ecology which to some extent shares characters of both Common and Northern bracken, but without indication of being a recent hybrid. It also has a peculiar ecology, growing on rather shallow soil beside a rich association of other plant species that are not usually associated with bracken. At first sight, it looks like common bracken (*aquilinum*) but on closer inspection it is found to have a bigger frond, a very leathery frond, and a very wiry and orange-coloured stipe. Its blade is also inclined to the stipe.

Conference organisers footnote:

Since presenting this preliminary talk, Drs Page and Mill have further refined and typified the overall classification of bracken in Scotland, taking into account the nomenclatural aspects necessary to equate these new British finds with bracken in the broader European perspective. The results of these more recent studies are presented in Page, C.N. and Mill, R.R (1995). *Botanical Journal of Scotland*, 47:139-140 and in press. *Pteridium aquilinum* subsp. *pinetorum* (Northern Bracken) has now become species *Pteridium pinetorum* comprising two subspecies: subsp. *pinetorum* and subsp. *osmundaceum*. *Pteridium aquilinum* now comprises three subspecies: subsp. *aquilinum*, subsp. *atlanticum* and subsp. *fulvum* (the unnamed bracken in the text above). Descriptions and illustrations of all of these new taxa are included in the forthcoming new edition of Page's *The Ferns of Britain and Ireland*, to be published shortly.

2: MOLECULAR MARKERS

Dr. Elizabeth Sheffield, University of Manchester.

This work was undertaken in response to Chris Page's last (1989) taxonomic revision of bracken in Britain (see footnote). Reference will therefore be made to '*aquilinum*', '*atlanticum*' and '*latiusculum*' but no opinions will be given on whether these should be recognised as varieties or subspecies. Reference will not be made to '*pinetorum*' as all the Scottish material that Chris has now been placed in subsp. *pinetorum* was, in 1989, called *latiusculum*.

Isozyme analysis is a powerful molecular technique. The details of the technique are not important as long as you remember that the end product of the analysis (banding patterns) represents different forms of proteins (isozymes) that are present in the individual. Isozyme banding patterns can often serve as 'fingerprints' to characterise an individual, species, genus, population etc. Most pteridophyte taxa, including most types of bracken, can be distinguished in this way. Moreover, isozyme banding patterns sometimes give clues to an individual's parentage and/or evolutionary events. For example, a few years ago we compared the banding patterns of British *aquilinum*, British (Scottish) *latiusculum* and North American *latiusculum*. The isozyme banding patterns for British and American *latiusculums* were not the same and there was no similarity in 2 critical marker enzymes between British *aquilinum* and North American *latiusculum*. However the pattern for British *latiusculum* was consistent with the theory that the other two taxa had at some point participated as parents in the evolution of British *latiusculum*. This meant that we had found molecular data to supported Chris's conviction that there is a *latiusculum*-type genome in Scotland.

Isozyme analysis of '*atlanticum*' produced a different result: for every isozyme that we could detect, the pattern in *atlanticum* was identical to that in *aquilinum*. This was surprising in view of the fact that most people who have seen this taxon agree that, morphologically, it is quite distinct from *aquilinum*. It is possible that, by continuing to screen for different isozymes, we would have eventually found a set of banding patterns that would characterise *atlanticum* but it was considered more likely that we were looking for molecular markers at the wrong level. In view of this we decided to try a more sophisticated technique involving analysis of the genetic variation in the DNA itself.

This part of the study was carried out in collaboration with Dr. Paul Wolf at Utah State University. One of the techniques used was restriction (enzyme) analysis. Again, the details of the technique are not important. Basically, DNA is extracted from the plant and carefully broken into fragments of different length using digestive enzymes which target specific points (restriction sites). These fragments are separated on a gel by applying an electric current (in much the same way as for isozyme analysis). Using lengths of DNA obtained from a standard bracken as probes to bind to the fragments, the fragments can be visualised as a banding pattern. Differences between the banding patterns of different individuals represent differences in the number and type of restriction sites in their DNA and this in turn can be used to measure genetic similarity/dissimilarity.

There are 3 types of DNA in plants: nuclear, mitochondrial and chloroplast, and each can be subjected to restriction enzyme analysis. Chloroplast DNA was the most extensively analysed in this study as it has proved extremely useful for detecting phylogenetic relationships in other taxa.

The study included *atlanticum* from Britain, *aquilinum* from Britain and France, and *latiusculum* from Britain, North America and Japan.

Data obtained from DNA analysis provided strong evidence for a *latiusculum*-type genome being present in Scotland. They also demonstrated that the Scottish *latiusculum* genome is very different from the *aquilinum* genome. However, genetic evidence to

support the contention that *atlanticum* plants are sufficiently different from *aquilinum* to warrant taxonomic recognition is still lacking.

Conference organisers footnote:

Since presenting this paper, Drs Page and Mill have again reclassified Scottish Bracken. See Page, C.N. and Mill, R.R (1995). *Botanical Journal of Scotland*, 47:139-140. *Pteridium aquilinum* subsp. *pinetorum* (Northern Bracken) has now become species *Pteridium pinetorum* comprising two subspecies: subsp. *pinetorum* (*P. aquilinum*, subsp. *pinetorum* var. *pinetorum* in the text above) and subsp. *osmundaceum* (*P. aquilinum* subsp. *pinetorum* var. *osmundaceum* in the text above). *Pteridium aquilinum* now comprises three subspecies: subsp. *aquilinum* (as described above), subsp. *atlanticum* (as described above) and now also subsp. *fulvum* (the third, unnamed, form of Northern Bracken in the text above).

FERN CONSERVATION: AN SNH PERSPECTIVE

Professor Michael B Usher (Chief Scientific Adviser), Scottish Natural Heritage.

The talk was divided into 6 parts.

- 1. How many species are there in Scotland?** There are about 66 pteridophyte species in Scotland. One species that we have not yet found is *Adiantum capillus-veneris*, which is abundant on west coast of Isle of Man - here's a challenge! There are some questions. What is *Diphasiastrum issleri* with its supposed parentage of *D. alpinum* and *D. complanatum* (which is abundant in Norway)? Can we locate more populations of *Dryopteris remota*, found last century by Loch Lomond? Is *Athyrium flexile* a distinct taxon (perhaps Britain's only endemic fern)? How many brackens do we really have?
- 2. Plant communities.** In the 3 published volumes of the National Vegetation Classification, how many times are ferns used to typify plant communities? In volume 1 (Woodlands), there is only one community characterised in part by a fern (*Pteridium aquilinum*). In volume 2 (Mires and Heaths) there is not a single community characterised by its ferns, and in volume 3 no pteridophytes are mentioned as characteristic of the lowland grassland communities. *Cryptogramma crispa*, *Oreopteris limbosperma*, *Blechnum spicant* and *Pteridium aquilinum* are, however, mentioned as characteristic components of some of the upland grassland communities.
- 3. Biogeographical zones in Scotland.** In analysing the fern distribution data for Scotland a map clearly shows that certain areas are characterised by particular assemblages of ferns and fern allies. For two examples, a Central Highland Zone is characterised by an assemblage of *Athyrium distentifolium*, *Lycopodium annotinum*, *Diphasiastrum alpinum*, *Dryopteris expansa* (all upland species) and *Lycopodium clavatum* (a more widely ranging species); and an Oceanic Zone (mostly western mainland) is characterised by an assemblage of *Asplenium marinum*, *Dryopteris aemula*, *Hymenophyllum wilsonii* and *Hymenophyllum tunbridgense*. Biogeographical maps provide a framework for thinking about the distribution of species in Scotland and demonstrating which species tend to occur together.
- 4. The legislative framework within which SNH works.** At present 4 fern species in Scotland are protected under schedule 8 of the Wildlife and Countryside Act (1981): *Woodsia ilvensis*, *Woodsia alpina*, *Cystopteris dickieana* and *Trichomanes speciosum*. The list of species protected under this Act is reviewed every 5 years. If *C. dickieana* is reclassified as a variety of *C. fragilis*, then it might be removed from the schedule (The Wildlife and Countryside Act only protects 'species', not 'varieties'). Under the 1981 Act, SNH was permitted to schedule SSSIs. However, only one site has been declared an SSSI primarily for its fern interest: the cave in which *C. dickieana* occurs.

Trichomanes speciosum is also protected by international legislation (The Bern Convention 1979 and the Habitats Directive of the European Union). On the IUCN list of species threatened at the world level, there are 22 vascular plants that occur in the UK, but none is a fern. Some fern species require special conservation measures in Scotland and, as the statutory agency, SNH has to advise Government on their management and conservation.

The UK Biodiversity Action Plan was published in January 1994. It recommends that conservation efforts should be focused first on 'globally threatened species' and second on 'threatened endemics'. No Scottish ferns fall into the first category, but *Athyrium flexile* might fall into the second. *W. alpina*, *W. ilvensis*, *C. dickieana* and *T. speciosum* fall into other, less urgent, categories of the UK Biodiversity Action Plan.

5. Monitoring. How are these species changing? In answering this question recording species distributions is important, as is recording of numbers in isolated populations. The following table lists all the Scottish pteridophyte species that have apparently declined by 20% or more in the last 25 years (as assessed by the number of 10km grid squares in which they occur).

Species	Pre-1970	Post-1970	% Decline
<i>Ophioglossum azoricum</i>	34	7	79
<i>Pilularia globulifera</i>	63	22	65
<i>Lycopodiella inundata</i>	42	16	62
<i>Lycopodium annotinum</i>	138	76	45
<i>Equisetum variegatum</i>	62	35	44
<i>Equisetum pratense</i>	125	79	37
<i>Thelypteris palustris</i>	6	4	33
<i>Asplenium septentrionale</i>	10	7	30
<i>Cystopteris montana</i>	20	15	25
<i>Polypodium cambricum</i>	17	13	24

6. What is SNH doing?

There are three particular things that SNH is doing.

First, the UK Biodiversity Action Plan, which fulfills the UK's obligations to the 1992 Rio Conference, sets targets. Most of these relate to work on habitats, but SNH is also required to prepare action plans for Scotland's rarest species and to increase public awareness of biodiversity.

Second, the Strategic Framework for plant conservation developed by the three country agencies (Scottish Natural Heritage, English Nature and the Countryside Council for Wales), working with the Joint Nature Conservancy Committee, has recently been agreed. The main aims are: to maintain the character of the natural flora; to maintain the natural range of species and their assemblages; to ensure the viability of species and assemblages, recognising the risks of depletion of commoner species and assemblages; to enhance the security of threatened species and their assemblages; to prevent the anthropogenic extinction of species over all or part of their range; and to recognise the importance of the UK's flora in an international context.

Third, SNH is encouraging partnership projects, e.g. the Scottish Rare Plants Project with the Royal Botanic Garden Edinburgh. SNH's own programme on species recovery is to be launched in 1995, but the emphasis on caring for Scotland's rarer species will be in partnership with other organisations.

PTERIDOLOGIST

INSTRUCTIONS TO AUTHORS



Pteridologist welcomes contributions written in English on all aspects of the natural history and horticulture of ferns and related plants, as well as articles about ferns in literature, art, architecture, music, furniture, folklore etc.....

.....*in fact, anything fern-related.*

SCRIPT: Ideally text should be provided in the form of a file downloaded to a floppy disc from a PC type of computer (not Mac or AMSTRAD PCW, though I'm trying to find conversion software and may become able). I can use formatted material from most popular word-processors, especially WORD, 1st WORD PLUS, (as well as WORDPERFECT, WORDSTAR, WINDOWSWRITE etc.) WP files should be accompanied by a raw text file in case I have any difficulties. Please check spelling ✓ grammar ✓ and meaning ✓ with care because even I get very tired and cross dealing with these fundamental aspects of communication. One space between sentences, please.

Computerless authors, please try. If you really can't, I'll accept type-script. I'll even tackle spidery scrawl on tatty bits of twice-used fish & chip wrappers! It just means that I have the labour of typing it all in, and I'm rather slow.

CONVENTIONS: Scientific names should be in italics (underlined in type-script or manuscript), the authority normal thus:

Polystichum setiferum Førskal

Polystichum setiferum Førskal

Polystichum setiferum Førskal

Variety names should be in normal type, capitalised and enclosed in single inverted commas thus:

Polystichum setiferum 'Plumoso-divisilobum'

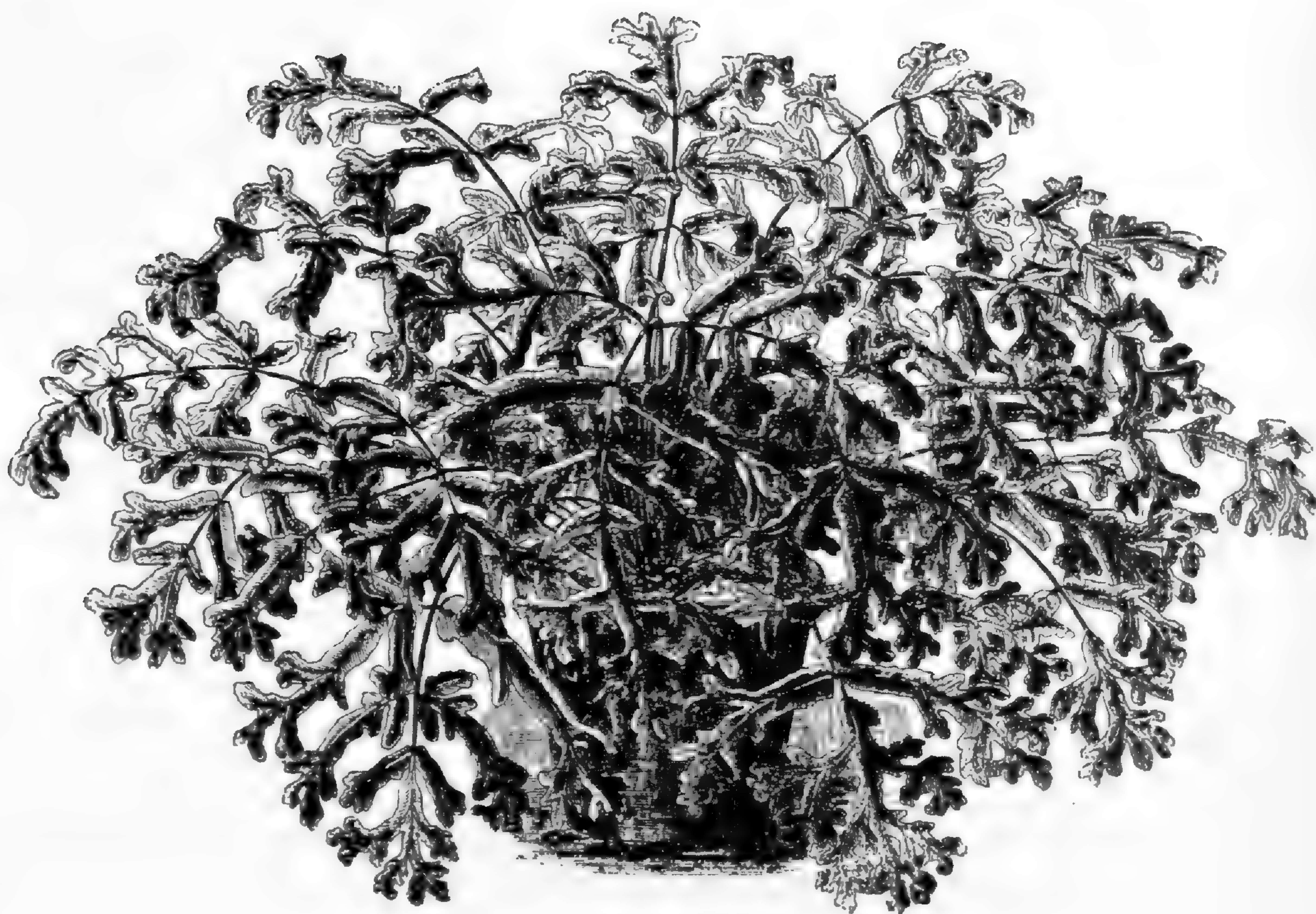
Common names should be in lower case:

soft shield fern

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*So you can see there are really very few rules.
I look forward to receiving ferny articles in any form,
but you'll make me particularly happy if you send stuff on disc.*

PTERIDOLOGIST



Please send contributions for **PTERIDOLOGIST** 1996
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to:

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WHERE TO SEE FERNS



A GUIDE TO FERN GARDENS, COLLECTIONS & NURSERIES

Introduction

The information in this Guide is published with the consent of the owners/managers of the gardens or institutions concerned. It is by no means a comprehensive list although every attempt has been made to ensure the information given is correct. The Society would very much appreciate being notified of any additions or amendments which may be useful to others wishing to pursue a greater knowledge of ferns and allied plants. Details of membership and the Society's activities are available from Mr A R Busby, Hon. Secretary, BPS, "Crozier's", 16 Kirby Corner Road, Canley, Coventry, CV4 8GD.

Key

- A Appointment essential
- B Botanic Garden
- E Entrance Fee payable
- F Admission Free
- H Hardy Plant Society Member
- M British Pteridological Society Member
- N Nursery or Garden Centre
- NC National Collection recognised by the NCCPG
- NT National Trust property
- NTS National Trust for Scotland property
- P Garden open to the public (whether publicly or privately owned)
- S Plants for Sale
- X Private Garden

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University of Cambridge Botanic Garden, Bateman Street, Cambridge CB2 1JF. Hardy and glasshouse ferns. Open all year; M-Sa, 8am-6.30pm/dusk; Su, 10am-6.30pm. B/E(Su)/F(M-Sa)/P. Tel: 0223 336265.

Cheshire

The Fernery, Tatton Park Gardens, Knutsford, WA16 6QN. Fernery including Dicksonia antarctica, Cyathea smithii, Cyathea dealbata, Woodwardia radicans. Open all year; 12-4pm every day except Mon (open B.Hols.) E/NT/P/S. Free to NT members. Tel: 0565-54822.

Cornwall

Burncoose and South Down Nursery, Gwennap, Redruth, TR16 6BJ. Mr C H Williams, owner. Tree ferns. Open: M-Sa, 9am-5pm; Su, 2-5pm. E(gardens)/F(nursery)/N/P/S. Tel: 0209 861112.

Glen Durgan, Mawnan Smith, Falmouth. National Trust garden including Dicksonia antarctica, Woodwardia radicans, etc. Open: March-Oct. 10.30am-5.30pm Tu-Sa. E/NT/P.

Michael and Bridget Graham, Polpey, Par. Small fernery; 1 acre garden with various fern species: Woodwardia, Dryopteris, Polystichum (inc. unusual ones from Nepal), Cyrtomium. Open 11am-5pm by appointment only. A/E(donation to BPS)/M/X. Tel: 0726 813219.

Penjerick Garden, Budock Water, Falmouth, TR11 5ED. Jane Bird, Head Gardener(M). Tender ferns: Dicksonia antarctica (5.5m high; 2.10m girth), Pteris cretica, Polystichum polyblepharum, Selaginella kraussiana, plus native ferns inc. Osmunda regalis, Cystopteris fragilis; also mosses & liverworts. Fern collection being developed in association with Royal Botanical Garden Edinburgh. Guided tours for groups. Open: Sun pm and Wed pm from 1 March-30 Sept. A/E/M/P/X. Tel: 0326 250074.

Trengwainton Gardens, Near Heamoor, Penzance, TR20 8RZ. Peter Horder, Head Gardener. National Trust garden including Dicksonia antarctica, Osmunda regalis, Asplenium scolopendrium, varieties of Blechnum and Polystichum, also Dryopteris, Matteuccia. Open: W,Th,F,Sa & B.Hols; March-Oct. 10.30am-5.00pm(5.30 Apr-Sept). Coaches by Appointment. F/NT/P/S. Tel: 0736 63148.

Trewidden Estate Nursery, Trewidden, Penzance, TR20 8TT. Mr M G Snellgrove, Manager. Dicksonia antarctica. Open M-Sa, 8am-1pm & 2-5pm. E/N/S. Tel: 0736 62087.

Cumbria

Hartside Nursery, Alston, CA9 3BL. Neil and Susan Huntly. Specialist alpine nursery stocking good range of container-grown hardy ferns, inc. some rarities. Open: March-Oct: M-F, 9am-5.30pm; Sa & B.Hols 10am-4pm; Su 12.30-4pm; Nov-Feb: by appt. A(Nov-Feb)/F/N/S. Tel: 0434 381372.

The Lakeland Horticultural Society Gardens, Holehird, Ullswater Road, Windermere, LA23 1NP. Miss C J Kelsall (M). National Collection of *Polystichum* (47 taxa); fern border and ferns throughout garden (30 taxa of 9 genera). Private Trust open to public all year 9am-dusk. F/NC/S(May)/P. Tel: 09662 6008 (11am-5pm, Apr-Oct).

John Mashiter, Elfrigg, Beachwood, Arnside LA5 0AU. Native ferns in woodland; unusual varieties in garden and rock garden. F/M/X. Tel: 0524 761761.

Plant Hunters' Plant Centre, Levens Hall, Levens, Kendal. Good selection of hardy fern varieties in retail plant centre; also Heaves Nursery (wholesale). Plant Centre open: Su-Th from Easter Sunday to 30 Sept, 10.30am-5.00pm. F/N/S. Tel: 0539 561126.

Robert Sykes, Ormandy House, Crosthwaite, Kendal, LA8 8BP. Private collection of British hardy ferns & varieties, especially *Polystichum*. A/M/X. Tel: 04488 321.

Sizergh Castle, Levens, Kendal, LA8 8AE. Mr M Hutcheson, Head Gardener (M). National Collections of *Asplenium scolopendrium*, *Cystopteris*, *Dryopteris*, *Osmunda*. Open: Apr-31 Oct, M,T,W,Th,Su,B.Hols, 12.30-5.30pm(gardens) 1.30-5.45pm(castle). E/NC/NT/P. Tel: 0539 560070.

Devon

Kings Gatchell, Higher Metcombe, Ottery St. Mary, EX11 1SL. Mr Kenneth Adlam (M). Private garden with National Collection of ferns (general). Open see Nat. Gardens Scheme Yellow Book. A/E(50p)/F(BPS members)/M/NC/S/X. Tel: 0404 813944.

Knightshayes Gardens Trust, The Garden Office, Knightshayes, Tiverton, EX16 7RG. Mainly British ferns & varieties. Nat. Trust garden open Apr-Oct, 11am-5.30pm. E/N/NT/S. Tel: 0884 253264.

Anthony Marriage, Rocombe, Lyme Regis. 3 acre private woodland garden with approx. 50 species of ferns and a few varieties, plus rare trees and shrubs. Open occasional Suns/Mons under National Gardens Scheme in Apr, May & Nov otherwise by appointment. A/E(for charity)/M/S/X. Tel: 0297 443295.

Dorset

Kingston Lacy House, Wimborne, BH21 4EA. 18 varieties of *Dryopteris*, *Polystichum*, *Asplenium*, *Athyrium*, *Matteuccia*, *Adiantum*. Open Apr-Oct, M,T,W,Sa,Su, 11.30am-6pm(gardens), 12-4.30(house). E/F(NT members)/NT/P/S(not ferns). Tel: 0202 883402.

Mr & Mrs C W Wright, Seaborough, Beaminster DT8 3QY. Two-acre garden with many native ferns inc. *Polystichum setiferum* 'Plumosum Bevis' & descendant. Open under National Gardens Scheme or by appt. A/E/H/S(occasionally)/X. Tel: 0308 68426.

Essex

Robert Bolton, Halstead CO0 4BQ. Small choice collection of hardy species and varieties, many from the original Bolton collection. A/F/M/X. Tel: 044085 246/258.

Gloucestershire

Highfield Nurseries, Whitminster, GL2 7PL. Hardy British fern varieties: Athyrium, Cyrtomium, Dryopteris, Matteuccia, Onoclea, Osmunda, Polypodium, Polystichum. Open M-Sa, 8am-5pm; Su, 11am-4pm. F/N/S. Tel: 0452 740266.

Hampshire

Apple Court Nursery, Hordle Lane, Hordle, Lymington, SO41 0HU. Roger Grounds or Diana Grenfell(M). 15-20 ferns including National Collection of Woodwardia; varieties of British & North American ferns. Open daily 10am-5pm. F/N/NC/S. 0590 642130.

Hillier Nurseries (Winchester) Ltd, Ampfield House, Ampfield, Romsey, SO51 9PA. Small chain of nurseries in Winchester, Romsey, Sunningdale and Newbury. Basic list of Hardy Ferns, including Adiantum, Asplenium, Athyrium, Blechnum, Dryopteris, Matteuccia, Onoclea, Osmunda, Polypodium, Polystichum.

Open 9am-5.30pm, M-Sa; 10am-5.30, Su & B.Hols. F/N/P/S. Tel: 0962 842288.

Sir Henry Peto Bt., Stream House, Selborne, Alton, GU34 3LE. 150-160 hardy British & foreign ferns in private woodland with stream. A/F/M/X. Tel: 0420 50246.

Spinners, School Lane, Boldre, Lymington, SO41 5QE. Mark Fillan (M). Over 30 ferns in woodland garden; hardy species inc. Blechnum, Adiantum, Dryopteris. Open: 20 Apr-1 Sept, every day, 10am-5pm. A/E/M/N/S. Tel: 0590 673347.

Herefordshire

Abbeydore Court, Abbeydore, HR2 0AD. C L Ward. Private garden with Polystichum, Polypodium, Athyrium, etc. Open from 3rd Sa in Mar to 3rd Su Oct: 11am-6pm daily (closed Wed). E/P/S. Tel: 0981 240419.

Mrs D M Blanchard, Fern Grotto, Near Leominster HR6 8RL. A 'Pulhamite' Fernery built 1872 by Josiah Newman (brother of Edward) with dropping well and stream containing various pteridophytes, some probably from the original collection of Edward Newman. Open any time by appointment. A/F/M/X. Tel: 0568 612063.

The Old Rectory, Leinthall Starkes, Ludlow, SY8 2HP.

1) Mrs Hazel Rickard: Polypodium, hardy & half hardy fern nursery; many unusual. A/F/M/N/S, and

2) Mr Martin Rickard: One acre garden with National Collection of Polypodium, Cystopteris and thelypteroid ferns, plus general fern collection. Some 900 taxa in all, predominantly hardy. A/F/M/NC/X. Tel: 0568 86282.

Hertfordshire

Anthony Pigott, Hertford SG14 3AQ. Study collections of Dryopteris and Equisetum. A/F/M/X. Tel: 0992 552269.

Bernard Williams, Welwyn Garden City. Private garden with 180 mainly hardy species and varieties. BPS members only. A/F/M/S/X. Tel: 0707 333797.

Humberside

Culag, Nafferton, Driffield, Humberside. Mrs J K Marston (M). Nursery with wide range of species & varieties. Open: Sa & Su, 1.30-5pm, Easter - mid-Sep, otherwise by appointment. A/M/N/S.

Kent

Clive Jermy, Otford TN14 5QR. *Dryopteris*. Open: June/July only by appt. A/F/M/X. Tel: 09592 3654.

Sissinghurst Castle Garden, Sissinghurst, Cranbrook, TN17 2AB. Wide variety of hardy ferns grown for their ornamental value in mixed plantings. Open: Easter to 13 Oct: Tu-F 1-6pm; Sa/Su 10am-6pm; closed Mons. incl. Bank Hols. E/NT/P/S. Tel. 0580 712850.

Lancashire

Waithman Nurseries, 36 Lindeth Road, Silverdale, LA5 0TY. Reginald Kaye (M). British species & varieties, mainly British hardy species. Open: M-Sa, 8am-12 & 1-5pm; Su, 1.30-5pm. F/M/N/S. Tel: 0524 701252.

Lincolnshire

The Fern Nursery, Grimsby Road, Binbrook, LN3 6DH. Neil Timm (M). British and foreign species and cultivars. Open: Weekends and most weekdays 10am-5pm; 1 March- 31 Dec. F/M/N/S. Tel: 0472 398092.

London

Chelsea Physic Garden, 66 Royal Hospital Road, London SW3 4HS. Historic apothecaries' garden with collection of ferns first described or cultivated by Thomas Moore (Curator, 1848-1887); planted in restored 1907 fern house. Open Apr -mid-Oct: W & Su, 2-5pm; also Chelsea Show Week: Tu-F, 12-5pm. B/E/P/S(rarely ferns). Tel: 071 352 5646.

Merseyside

Southport Botanic Gardens, Botanic Road, Churchtown, Southport PR9 7NB. Indoor Fernery built late 1870s with grottos and waterfalls; hardy & half hardy ferns inc. *Dicksonia* situated in public park managed by Sefton Parks Dept. Open: 10am-4pm, April - end Sep. B/F/P. Tel: 0704 214164.

Northumbria

Howick Gardens, Alnwick, Northumberland. Wooded garden specialising in rhododendrons, includes *Blechnum penna-marina*, *Matteuccia* and *Osmunda*. Open: Apr-Sep, 2-7pm. E/P. Tel: 0665 577285.

Nottinghamshire

Newstead Abbey Park, Nottingham NG15 8GE. Hardy ferns in outdoor fernery dating from 1860 in abbey gardens managed by City of Nottingham. Gardens open daily: 10am-dusk; closed last Friday in November. E/P. Tel: 0623 793557.

Oxfordshire

Dr Keith and Mrs Doreen Holly, Oxford, OX2 8DX. Small collection of hardy ferns in a suburban garden. Open to BPS members only. A/F/M/X. Tel: 0865 515879.

University of Oxford Botanic Gardens, Rose Lane, Oxford, OX1 4AX. Tropical & hardy British ferns. Open: 9am-5pm (winter:4.30pm); greenhouses, 2-4pm; closed Good Fri & Christmas Day. B/E(Jul & Aug)/F(Sep-June)/P. Tel: 0865 242737.

Staffordshire

Mrs Joyce Heywood, Chapel Chorlton, ST5 5JN. Various hardy ferns in garden of unusual hardy plants. A/F/H/S/X. Tel: 0782 680206.

Somerset

Miss Joan Loraine, Greencombe, Porlock, TA24 8NU. Private garden with National Collection of *Polystichum*, etc. Open: Sa-Tu, 2-6pm, Apr-July. E/M/NC/S/X. Tel: 0643 862363.

Surrey

Mrs Pat Roberts, Seale, Farnham GU10 1NG. Woodland garden with hardy ferns. A/F/M/X. Tel: 02518 2778.

Royal Botanic Gardens, Kew, Richmond, TW9 3AB. Approx. 1200 taxa of temperate and tropical pteridophytes grown, many of which are displayed, mainly in the Princess of Wales Conservatory. Open: M-Sa, 10am-6.30 (winter: 4pm), Su & B.Hols, 10am-8pm. B/E/P. Tel: 081 940 1171.

Royal Horticultural Society Garden, Wisley, Woking, GU23 6QB. Extensive collection of hardy species and cultivars inc. *Polystichum*, *Dryopteris*, *Polypodium*, *Osmunda*, etc. in gardens, woodlands and greenhouses. BPS Centenary collection by the glasshouses. Open all year; M-Sa 10am-7pm/Dusk; Su RHS members only. B/E/F(RHS members)/P/S. Tel: 0483 224234.

Savill Garden, Wick Lane, Englefield Green, Egham, TW20 0UU. John Bond, Keeper of the Gardens (M). National Collection of Hardy Ferns distributed throughout the garden. Open: all year (except 25-28 Dec), M-F, 10am-6pm, Sa/Su, 10am-7pm/sunset. E/NC/P/S. Tel: 0753 860222.

University of London Botanic Garden, Egham Hill, Egham, TW20 0BN. Brian Gale, Curator (M). University botanic garden with wide range of species (inc. tropical) of ferns and fern allies, but no cultivars. Open on Open Days and by appointment. A/B/E/M. Tel: 0784 433303 (Brian Gale or Anne Daly).

Sussex

Nick Schroder, Haywards Heath, West Sussex RH16 1JG. General collection of hardy ferns, especially *Athyrium*. A/M/X. Tel: 0444 415271.

Wakehurst Place (Royal Botanic Gardens, Kew), Ardingly, Haywards Heath, West Sussex RH17 6TN. Limited collections of cultivated hardy ferns, including *Osmunda*, *Blechnum*, *Polystichum*, plus ferns of the Sussex Weald in woodlands, incl. *Dryopteris aemula*. Open: all year, times vary. B/E/NT/P. Tel: 0444 892701.

Warwickshire

Fibrex Nurseries Ltd, Honeybourne Road, Pebworth, Stratford-upon-Avon, CV37 8XT. Mrs Hazel Key (M). Nursery with British & foreign hardy and tender ferns. Open: Apr-Jul, T-Su, 12-5pm; Aug-Mar, M-F, 12-5pm. F/M/N/S. Tel: 0789 720789.

West Midlands

Birmingham University Botanic Garden, Winterbourne, 58 Edgbaston Park Road, Edgbaston, Birmingham B15 2RT. Prof. R.A.D. Cameron. Hardy and Indoor Ferns. A/B/E/P. Tel: 021 414 5590.

Birmingham Botanical Gardens and Glasshouses, Westbourne Road, Edgbaston, Birmingham B15 3TR. Mainly indoor, inc. tree ferns in Palm House, and some hardy ferns. Open daily: 10am-dusk (or 8pm). B/E/P/S. Tel: 021 454 1860.

Clive Brotherton, Sedgeley, Dudley DY3 3BJ. Private garden with magnificent collection of *Cheilanthes*. A/F/M/X. Tel: 0902 671482.

Mr A R Busby, Canley, Coventry, CV4 8GD. Private garden with National Collection of Osmunda and a wide selection of British and foreign hardy ferns. Open: July-Sept only. A/F/M/X. Tel: 0203 715690.

Ray and Rita Coughlin, Lydiate Ash, Bromsgrove B60 1NZ. Garden with extensive collection of Adiantum, Athyrium, Dryopteris, Polypodium, Polystichum, etc. A/F/M/X. Tel: 021 453 3416.

Alan and Valerie Ogden, Hopwood, Birmingham. Private garden with British & foreign species & varieties, incl. Dryopteris, Polystichum, Adiantum, Osmunda, Matteuccia & Onoclea; some in greenhouse. A/M/X. Tel: 021 445 3804.

Brenda and Ray Smith, Shirley, Solihull. Private garden with hardy and tender fern species and varieties. A/F/M/X. 021 744 7775.

Worcestershire

Treasures of Tenbury Ltd, Burford House Gardens, Burford, Tenbury Wells, WR15 8HQ. Wide range of ferns in garden borders, garden centre, 18thC house, gardening museum, tea room. Open mid-March to mid-Oct, M-Sa 10am-5pm; Su 1-5pm; in winter M-F by appt. A(winter)/E/N/P/S. 0584 810777.

Yorkshire

Mr Jack Bouckley, Harrogate, N. Yorks. Private garden, general ferns. A/F/M/S/X. Tel: 0423 566948.

Michael Myers, Smelthouses, Summerbridge, Harrogate HG3 4DH. Approx. 90 varieties of hardy ferns grown in walls & raised beds. A/E(for NCCPG)/M/S(occasionally)/X. Tel: 0423 780291.

Northern Horticultural Society, Harlow Carr Botanical Gardens, Crag Lane, Harrogate, N. Yorks. HG3 1QB. National Collections of Dryopteris & Polypodium. Open: all year, 9am-dusk. B/E/NC/P/S. Free to NHS members. Tel: 0423 508237.

SCOTLAND

Branklyn Garden, Branklyn, Perth PH2 7BB. National Trust for Scotland garden with extensive collection of approximately 40 species and varieties of Adiantum, Asplenium, Athyrium, Blechnum, Cryptogramma, Cystopteris, Dryopteris, Gymnocarpium, Osmunda, Onoclea, Matteuccia, Phegopteris, Polypodium, Polystichum, Selaginella. Open: 1 March - 31 Oct., 9.30am-sunset. E/NTS/P/S. Tel: 0738 25535.

Dawyck Botanic Garden, Stobo, Peeblesshire EH45 9JU. David Knott, Asst. Curator. A specialist garden of the RBG Edinburgh with hardy native and N. American ferns in a woodland garden. Open daily: 15 March - 31 Oct. 10am-6pm or by appt. B/E/P. Tel: 0721 254.

Glasgow Botanic Gardens, 730 Great Western Road, Glasgow G12 0UE. National Collection of Tree Ferns (Kibble Palace), tropical ferns including collection from Papua New Guinea, in Main range of glasshouses. Open: Kibble Palace, 10am-4.30pm daily; Main range, 1-4.30pm daily; Filmy Fern House by request. A(filmy ferns)/B/F/NC/P. Tel: 041 334 2422.

Peter Hainsworth, Achnashellach, Ross-shire. Private garden approx. 100 species plus some variants of native and exotic ferns in 1 acre wild garden; less hardy ferns in plastic tunnel. A/F/M/X. Tel: 0520 6218.

Inverewe Garden, Poolewe, Ross-shire IV22 2LG. Peter Clough (M). Indoor & Outdoor fern collections. Open: daily, dawn-dusk. E/NT/P. Tel: 0445 86441.

Linn Nursery, Shore Road, Cove, Dunbartonshire, G84 0NR. Dr J Taggart. Osmunda, Dryopteris, Athyrium and Polypodium in lake-side setting, marsh and rockery in Gulf Stream garden of over 6,000 species/varieties. Open: 10am-dusk; closed Thurs & Sun am. F/N/P/S(not ferns). Tel: 0436 842242.

Logan Botanic Garden, Port Logan, Stranraer, Wigtownshire DG9 9ND (14 miles south of Stranraer on B7065). Barry Unwin, Asst. Curator. Specialist garden of RBG Edinburgh, established 100 years ago by sea in Gulf Stream. Temperate, southern hemisphere plants; tree ferns inc. various Macaronesian and southern hemisphere ferns in walled garden. Open daily: 15 March - 31 Oct. 10am-6pm or by appt. B/E/P/S. Tel: 0776 86231.

Royal Botanic Garden Edinburgh, Inverleith Row, Edinburgh EH3 5LR. Dr C N Page (M). Subtropical Fern House; various study collections including Equisetum & Pteridium. Open: March-April 10am-6pm; May-Aug 10am-8pm; Sept-Oct 10am-6pm; Nov-Feb 10am-4pm. A(Dr Page)/B/F/P. Tel: 031 552 7171.

Alison Rutherford, Helensburgh, Dunbartonshire. Trichomanes speciosum, Hymenophyllum demissum in Wardian Case; small fern border in garden; woodland fernery in progress. Open: Evenings (exc. Sa). A/F/M/X. Tel: 0436 71510 (after 10.30am exc. Weds) or 75603 (eves).

Younger Botanic Garden, Benmore, Dunoon, Argyll PA23 8QU. Arthur Hall, Asst. Curator. A specialist garden of RBG Edinburgh with 26 species of native ferns in woodland garden. Open daily: 15 March - 31 Oct. 10am-6pm or by appt. B/E/P/S. Tel: 0369 6261.

WALES

Christopher D Fraser-Jenkins, Bridgend, Mid-Glamorgan. National Collection of Dryopteris (over 300 taxa) and many other ferns, plus greenhouse, rare trees, shrubs and herbaceous plants. Open occasional Sundays in May and June (under National Gardens Scheme) and by appointment. A/E(for charity)/M/NC/X. Tel: 0656 766880.

CHANNEL ISLANDS

Mrs Gunilla Hailes, Guernsey. Adiantum, Asplenium, Athyrium, Blechnum x 3, Dryopteris, Gymnocarpium, Matteuccia, Onoclea, Osmunda x 5, Polypodium, Polystichum; plus 100' tropical greenhouse. A/F/M/X. Tel: 0481 47293.

REPUBLIC OF IRELAND

National Botanic Gardens, Glasnevin, Dublin 9. Dr Charles Nelson. Tropical fern species in glasshouses; hardy ferns out of doors; miscellaneous collections of other Pteridophytes. Open: Summer 9am-6pm; Winter 10am-4.30pm; glasshouses at times as posted. B/F/P. Tel: (010 353) 1 374388.

GERMANY

Botanischer Garten der Universität Freiburg, Schanzlestrasse 1, D-7800 Freiburg I.BR. Prof. Dr D Vogellehner (M). University botanical collection including: Polypodium musifolium, Aglaomorpha heraclea, A. coronans, Hemionitis arifolia, Cyathea australis. Open: Tu,Th,Sat 2-4pm; Su 10am-12/2-4pm. B/F/P/S. Tel: (010 49) 671 2032763.