THE FERN SOCIETY OF VICTORIA Inc.

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NEWSLETTER

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Subscriptions fall due on 1st July each year.



CAN YOU HELP??

Do you have any suggestions for speakers and/or subjects for our meetings this year? You may know someone you think would be interesting to fern growers or want to offer yourself (Yes, I believe in miracles!!) as a speaker. The other way you can help is with suggestions of things you would like to hear or see something about. Please contact any committee member (they are listed above). \sim

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1997 FORTHCOMING MEETINGS & EVENTS

MARCH GENERAL MEETING Thursday 20th March at 8.00 p.m

FERN AND GARDEN PHOTOGRAPHY

with Keith Hutchinson

*Tricks and strategies for better shots in difficult garden situations.

APRIL GENERAL MEETING Thursday 17th April

"MY FAVOURITE FERN"

Bring along YOUR favourite fern. There should be a wonderful collection of ferns on display at this meeting.

VENUE: Victoria Bowling Club, 217 Grattan Street, Carlton.

MEETING TIMETABLE:

7.30 Pre-meeting activities - Sale of ferns, spore, books, merchandise and Special Effort tickets. Also library loans.

- 8.00 General Meeting.
- 8.30 Topic of the Evening.
- 9.30 Fern Competition judging, Fern identification and pathology, Special Effort draw.
- 9.45 Supper.
- 10.00 Close.

FERN SHOW

Saturday and Sunday 22nd and 23rd March 1997 National Herbarium Royal Botanic Gardens

*READ the Show Secretary's article in this issue for NEW information
*TELL the Show Committee what you are going to do at the Show
*PREPARE your display ferns, competition entries and ferns for sale
*BOOK IN the ferns you have for sale, with Bernadette
*USE the pamphlets in January's issue for promotion in your community
*COME ready to enjoy yourself and be a good Fern Society ambassador!

March Competition:A FERN PHOTO.April Competition:PLATYCERIUMS.May Competition:DRYNARIAS.





FERN SHOW 1997 Saturday 22nd March - Sunday 23rd March. National Herbarium - Royal Botanic Gardens.

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By the time you receive this newsletter the Fern Show will be only a short time away and I hope that the weather between the time of writing this article (mid-February) and our Show is a little kinder to our ferns. The long, hot and very dry summer season in Melbourne and most of Victoria has certainly not made it easy for them (or us!). It is therefore most important that everyone works hard at grooming at least a few ferns to contribute to our competition and display.

The Show will be open from 10.00 a.m. to 5.00 p.m. on both days.

Details of the Fern Competition categories are repeated below. To assist the competition stewards please prepare a list of your competition ferns, by category, beforehand.

Don't forget that the theme for our feature display will be "Ferns of New Zealand". and we would like to present a good representative display of these ferns. If you are unsure of which ferns are indigenous to New Zealand Chris Goudey's book, "A Handbook of Ferns for Australia and New Zealand" will be helpful.

For safe return of your ferns after the Show please ensure that they have some clear form of identification.

We plan to commence setting up the fixtures in the Display and Sales areas at 12 noon on Friday 21st March and should be in a position to accept Display and Sales ferns by approximately 2.00 p.m. We would be glad to hear from members able to help with setting up on this day.

Anyone wishing to bring ferns after 6.00 p.m. on Friday or early on Saturday should contact Don Fuller (03 9306 5570).

Those wishing to sell ferns are reminded that they need to obtain a "booking in" form from Bernadette Thomson (03 9399 1587).

We will also need a large number of cardboard cartons for packing sold ferns in the sales area. If you can help it would be greatly appreciated. Bring them when you come on Friday or during the Show.

Hoping to see you all at the Show,

Don Fuller.

FERN COMPETITION CATEGORIES.

2.	Asplenium

3. – Blechnum

Adjantum

- 4. Davallia (including Humata and Scyphularia)
- 5. Fern Ally (eg., Lycopodium, Psilotum, Selaginella)
- 6. Platycerium (single or multiple heads)
- 7. Fern in Hanging Container
- 8. Small Tree Fern in Pot (Cyathea, Dicksonia, Cibotium)
- 9. Fern Other Than Above



NEW FERN BOOKS.

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The Royal Botanic Gardens Kew (U.K.) has advised the Fern Society of Victoria of three new fern-related scientific books which they are publishing. The three books are:

"Pteridology in Perspective" edited by J M Camus, M Gibby and R J Johns.

The proceedings of the Pteridophyte Conference held to commemorate the centenary of the birth of R. R. Holttum. The proceedings comprise more than seventy papers covering a wide variety of subjects from fern taxonomy to horticulture and conservation. Hardback 700 pp £60.

"Index Filicum - Supplementun Sextum 1976 - 1990" R J Johns.

This sixth supplement provides an index to all names in the ferns and fern-allies published between 1976 and 1990. Softback 414 pp £30.

"Holttum Memorial Volume" edited by R E Johns.

The volume comprises a series of papers published to commemorate the centenary of the birth of Professor Holttum in 1895. The papers cover a wide range of subjects reflecting the broad interests of Professor Holttum. Expected publication date April 1997. No price as yet.

In addition to these new books Kew Gardens have also published three others related to ferns. These are:

"The Plants of Mount Kinabalu 1 - Ferns and Fern-allies" by B S Parris, R S Beaman and J H Beaman. Softback 165 pp £15.

"Pteridophytes of Tropical East Africa" by R J Johns. Softback 132 pp £8.

"Authors of Scientific Names in Pteridopyta" by Reg Pichi Sermolli. Softback 78 pp £12.

Special discounts are offered for the purchase of the publications including a CD Rom containing the three new publications if any four books are purchased. Further details on ordering can be obtained from Barry White on (03) 9337 9793.

PLANT SALE AT THE BOTANIC GARDENS.

An interesting 'extra' on our Fern Show weekend is the Friends of the Botanic Gardens' autumn plant sale which will be 'next door' to the Herbarium, in the Old Melbourne Observatory. The hours are 10 - 4 on Saturday and 10 - 3 on Sunday. This is quite a popular event with many gardeners so we may well be able to benefit by attracting some of their crowd and vice versa. The gardeners win all round! I'm certainly hoping to look in at some stage.

"FERNS OF TASMANIA" BOOK.

The softcover edition of Michael Garrett's eagerly awaited book "The Ferns of Tasmania - Their Ecology and Distribution" is available from Don Fuller (03 9306 5570 or see Don at our meetings) at our Society for \$45. This discount of 10% off the recommended price will stand for a limited time, after which the normal price of \$49.95 will apply.

For details of the book, see Chris' message in the Jan/Feb. issue of the Newsletter. -&



The garden of Reg and Mary Kenealy, "Mary's Villa", at 55 Falls Road, Marysville will be open on Saturday 12th and Sunday 13th April.

This is a "Fern and Fairy" garden and should be of interest to fern lovers. There are many native and exotic ferns set among the sheltered walkways.

Featured also are many trees and shrubs which hopefully will be showing their autumn colours.

There are many spots throughout the garden and down by the Steavenson River where you may like to sit for a pienic lunch.

Morning and afternoon teas will be available (proceeds to Marysville & District Garden Club). Entrance fee \$3.50.

IRIDESCENT FERNS AND THEIR SHADY BEHAVIOUR

Robbin C. Moran

I first laid eyes on *Trichomanes elegans*, a terrestrial species of filmy fern (Fig. 1), in February 1988 after I had arrived in a remote rain forest in Panama. The plant was growing in a dark trailside thicket and was conspicuous because of its brilliant, metallic blue-green leaves. The color was so intense, and the blade so thick and shiny, that the plant looked like a plastic fern you occasionally see in cemeteries, cheap restaurants, and outdoor floral displays. For a moment, I thought that it *was* a plastic fern that had been put there by my waggish collecting partner trying to play a trick on me.



Fig. 1. An iridescent filmy fern Trichomanes elegans

I rubbed the leaf blade between my fingers - it was real, sure enough. But the metallic blue-green still seemed phony. As I viewed the blade from different angles, the color shimmered over the surface; but when viewed nearly edge-on, the color vanished and the blade assumed the normal green of chlorophyll. Would anyone believe me about the color? I decided to photograph the plant, and uncased my camera loaded with high-speed film for photography in the deep shade of the forest floor. I aimed, focused, and pushed the light-meter button. The meter's needle plunged to zero. It was too dark. The photograph would have to wait for another plant in a brighter spot.

After returning to the United States, I learned that this encounter with *Trichomanes elegans* was my first with an iridescent fern. Only a handful of fern species are iridescent, all of them tropical (Table 1). They glisten in metallic colors like the *Trichomanes*, but some are sky-blue rather than blue-green. I began to wonder: What strange alchemy produces iridescence, and how does it benefit the plants, if at all? A trip to the library revealed that the answers to these questions had been sought, not surprisingly, by several botanists.

The first botanist to investigate iridescence was Ernst Stahl, a German morphologist working in Bogor, Java. He examined a species of iridescent spikemoss, *Selaginella willdenowii*, and published his report in 1896. In the report, he speculated that iridescence was caused by granules of a reflective pigment embedded in the cuticle - the thin layer of fat or wax covering the outer walls of the plant's epidermis.

No further research was done on iridescence until 1971, when Denis Fox and James Wells, researchers from the Cranbrook Institute of Science in Michigan, re-examined the same species of spikemoss studied by Stahl. They observed that when the plant's leaves were wetted with water or alcohol, or were allowed to wilt, the iridescence disappeared. Conversely, when wet leaves were allowed to dry, or when wilted leaves regained their turgidity, the iridescence reappeared. Fox and Wells concluded from these observations that iridescence must be caused by an optical effect rather than a pigment.

The next step forward came in the mid 1970s from. David Lee, presently with Florida International University and one of the world's leading authorities on how leaves interact with light. He pointed out that the leaves of *Selaginella willdenowii* contained no iridescent pigments that were extractable with organic solvents, and that iridescent pigments had never been found in either plants or animals. Furthermore, studies with a light-microscope did not reveal pigment granules embedded in the cuticle of *S. willdenowii* as postulated by Stahl. These observations, along with those of Fox and Wells, effectively nailed the lid on the coffin of the pigment hypothesis.

Table I

IRIDESCENT FERNS AND SPIKEMOSSES

Ferns

Anemia makrinii Maxon, Mexico.

Athyrium cordifolium (Blume) Copeland, SE Asia and Indonesia.

Danaea nodosa (L.) J.E. Sm., American tropics. Danaea ulei H. Christ, Amazonia (juvenile leaves only). Didymochlaena truncatula (Sw.) J. Sm., tropics worldwide, but reported as iridescent only in Malaysia.

Diplazium cordifolium Blume, Brunei (juv. leaves only). Diplazium pinnatifidum Kunze, western Amazonia. Diplazium palmense Rosenstock, Costa Rica and Panama. Diplazium porphyrorachis (Baker) Diels, Brunei (juvenile leaves only).

Elaphoglossum sp., Ecuador.

Lindsaea lucida Blume, Southeast Asia.

Lindsaea scandens Hook. var. terrestris Holttum, Malay Peninsula, Borneo, Sumatra.

Mesophlebion falcatilobum Holttum, Brunei. Polystichopsis hanifii (Holttum) Holttum, w. Malaysia. Teratophyllum rotundifoliatum (Bonap.) Holt., Malaysia. Trichomanes elegans Rich., American tropics.

Spikemosses

Selaginella willdenowii (Desv.) Parker, SE Asia and Indonesia.

Selaginella uncinata Spring, China.

But what did the evidence suggest about how the colors are produced? Lee pointed out that the behaviour of the colors could be explained by an optical effect called "thin-film interference". This effect occurs when a thin-layer or film is present between two substances with different lightrefracting qualities (such as water and air). The thinlayer reflects more of some colors of light and less of others; in other words, some colors are more highly reflected and others more highly transmitted. Although this physical basis of thin-film interference is primarily known to only a few science-minded people, the visual effects of thin films are familiar to everyone. It causes the rainbow colors seen on water puddles covered by a film of oil. It also produces the colors seen on coated lenses of cameras and binoculars, as well as the metallic colors on the wings of certain butterflies and beetles.

In the leaves of *Selaginella willdenowii*, Lee suspected that iridescence was caused by a thin-layer present in the upper epidermis. The layer must reflect

more blue light and transmit more red. Thus, the leaf appeared blue because that color is the most highly reflected. Lee, however, only predicted the existence of the thin-layer; he did not actually see one in the plants. Naturally, his next step was to search for the expected thin-layer.

In 1978, Lee began his search with Charles Hebant, from the University of Montpellier, France, They started by mathematically calculating the exact thickness of a thin-layer necessary to reflect blue light in a plant cell wall. That thickness turned out to be 71 to 80 nanometres - a nanometre being only a billionth of a millimetre. Then they made extremely thin cross sections of the leaves of two iridescent spikemosses, Selaginella willdenowii and S. uncinata, and examined the sections with a transmission electron microscope. In the outer cell wall of the upper epidermis, they found not one, but two thin-layers (Fig. 2), parallel to one another - an arrangement known to intensify iridescent colors in animals and insects. Equally important was where they did not find thin-layers: namely, in the outer cell wall of the lower epidermis, which was not iridescent, and the green (non-iridescent) leaves of normally iridescent spikemosses. (Such green, noniridescent leaves occur when normally iridescent plants are grown in full light.) These findings clearly associated iridescence with thin-layers.



Figure 2. Thin-layers (dark lines indicated by arrows) as seen in a transverse section in the outer cell walls of the upper epidermis of *Selaginella willdenowii* (left) and *S. uncinata* (right). The photographs were taken with a Transmission Electron Microscope. (From Hébant and Lee 1984).

Besides in spikemosses, thin-layers have also been found in ferns. So far, only three species of iridescent ferns have been studied, but the thin-layers were always present. The ferns that have been studied are: *Danaea nodosa*, which belongs to the primitive family Marattiaceae; *Teratophyllum rotundifoliatum*, which belongs to the highly derived family Lomariopsidaceae; and *Trichomanes elegans*, the species of filmy fem (Hymenophyllaceae) I first saw in Panama.

The thin-layers of these three ferns are not alike. Those in *Danaea* and *Teratophyllum* are located in the outer cell wall of the upper epidermis and oriented parallel to one another as in the spikemosses. But the layers numbered 18 to 30 rather than 2 as in the spikemosses. The *Trichomanes* is completely different: its thin-layers are located in the chloroplasts within the cells of the upper epidermis. These chloroplasts contain dark bodies called granae that are stacked to form a thin-layer of exactly the right thickness to reflect blue light. Because the thin-layers are inside the cell rather than in the outer cell walls, they are not affected by wetting. Thus, the blade of *T. elegans* does not lose its iridescence when wet. (Wetting changes the refractive index of the thin-layers, causing them to lose their blue reflectiveness.)

Although they differ in the details of their thin-layers, iridescent ferns and spikemosses have one thing in common: all, except *Anemia makrinii* grow in deep shade. This suggests that iridescence adapts plants to dark environments. To evaluate this idea, it is necessary to examine what plants are up against in the Stygian gloom of the forest floor.

A plant on the forest-floor does not dwell in paradise. The light levels there are typically lower than one percent of the full sunlight above the forest, and light that dim severely limits photosynthesis for most plants. (At the La Selva Biological Field Station in Costa Rica, David Lee found that the mean percentage of full sunlight for a spot on the forest floor harboring Trichomanes elegans was only 0.25 %.) But low light is only half the problem. The light quality - the amount of different colors composing the light - is also poor. Red light is particularly scarce because most of it has been absorbed by the overhead vegetation. In red-depleted light, plants languish because red is the color most efficiently used in photosynthesis. Thus, from a plant's point-of-view, the forest floor is a difficult place to live because it is not only dark but also deficient in red light.

It is under these stressful conditions that iridescence benefits plants. Iridescence allows more red light to pass through the epidermal cell wall to the chloroplasts where photosynthesis takes place. It does this at the expense of reflecting more blue light than normal - light which is used less efficiently in photosynthesis. This increased transmission of red light enhances photosynthesis and thereby improves growth. Thus, the main benefit of iridescence to plants - the increased transmission of red light - is something we humans don't see. What we do see - the iridescence - is merely a beautiful by-product.

Besides thin-layers, iridescent ferns have other adaptations for life on the forest floor. The chloroplasts in their upper epidermis are larger and fewer per cell. Most plants have 20 to 200 chloroplasts per cell, and these measure only 4 to 6 micrometres in diameter. But iridescent ferns and spikemosses have 1 to 12 per cell and these measure 10 to 27 micrometres in diameter. The larger, fewer chloroplasts form a nearly continuous layer for capturing light (Fig. 3, right).



Figure 3. Leaf sections of *Teratophyllum rotundifoliatum* showing the chloroplasts situated on the inner surface of the the upper epidermis cells. Light is focused on the chloroplasts by the lens-shaped outer walls of the cells. At left and middle are cross sections; at right is a paradermal section—one cut in nearly the same plane as the surface of the blade. (drawn from Nasrulhaq-Boyce and J.G. Duckett 1991)

The plant's ability to capture light is further enhanced by the shape of the outer cell walls of the upper epidermis. In the spikemosses and *Teratophyllum*, these walls are curved like a lens. When seen en masse under high magnification, this shape imparts the appearance of plastic-bubble packing material (Fig.4). The lens-like shape focuses light on the chloroplasts located on the inner side of the cell (Fig.3). These chloroplasts orient themselves parallel to the leaf surface to present the largest amount of surface area for capturing incoming light.



Figure 4. The convexly curved upper epidermal cells of *S. willdenowii*. This photograph was taken with a Scanning Electron Microscope. (From Hébant and Lee 1984).

These light-capturing adaptations of iridescent ferns and spikemosses are remarkable. They can be likened to the camera that I tried to use in Panama to photograph *Trichomanes* elegans. The thin-layers in the plant's upper epidermis act like the coating of the camera's lens, reflecting more of some colors and less of others. The convex outer cell wall corresponds to the camera's lens, focusing light toward the inner side of the cell, or the back of the camera body, so to speak. And at the focal point sit the chloroplasts which, like a camera's film, absorb the incoming light.

Of course, this analogy should not be carried too far. Iridescent ferns and spikemosses "work" well on the dark forest floor - my camera doesn't.

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Wylie, R., 1948. The dominant role of the epidermis in the leaves of *Adiantum*. American Journal of Botany **35**: 465-473.

CORRECTION: In the Speaker Report of "Ferns or Tasmania" by Michael Garrett published in Volume 18 Number 6 (Nov.-Dec. 1996) I reported that Pandanus grows in Tasmania. The correct plant is Pandani, *Richea pandanifolia*. It is closely related to the tiny *Scoparia*. Pandani has thick, leathery strap leaves which are arranged in a compact, raised rosette.

My apologies to Michael and readers - it was a case of hearing the closest familiar word to that which was said.

FERN COMPETITION RESULTS FEBRUARY GENERAL MEETING

COMPETITION CATEGORY: TREE FERNS

- Jack Barrett
 Barry White
- Cyathea cooperi "Revolvulens" Cyathea woollsiana Cvathea australis

Dicksonia lanata

Lyn Gresham

- 2. Lyn Gresham
- 3. Dick Kissane

EXHIBITORS' DRAW:

SPECIAL EFFORT:

Jean Boucher, Joy Horman, Margaret Radley, Angela Milligan



Mr. Dick Kissane kindly wrote this interesting article in response to a member's request. He won the competition for mounted fern fronds at our August 1996 meeting. The specimen sheet reproduced on the next page is one of his, too. Many thanks, Dick.

COLLECTING AND MOUNTING FERNS Dick Kissane

Your collection can be as simple or as extensive as you wish. The choice is yours, but it is sure to be a pastime that brings a lot of pleasure and has the potential to be very useful.

Collecting ferns is, by definition, what fern lovers are all about. But why would we want to mount ferns?

Well, I've often wondered about this when saying the last rites over what was once a good looking fern that I'd tried to entice into something larger. At least I would have had something to remember it by if I had mounted a frond before it passed on. We have in the midst of our society both fern lovers and fern growers - I belong to the former group which sometimes results in the above situation due to inexperience.

Another reason to mount ferns could be to assemble a collection to use as an aid to identification. This could be more than useful if you have visits from grandchildren who delight in collecting your only means of identification - i.e., plant tags.

Just a few points on the collecting aspect. The most useful fronds to collect are those that are almost at the full-grown stage, so that the indusium is at its best important for identification. If the fern is dimorphic, both fertile and sterile fronds should be collected. Also include stipe bases and the rhizome if there is one.

If collecting ferns from private land, remember that the owners' permission should be obtained before doing so and that the removal of ferns from public land can only be done with a permit. Personally, I have not had any problems with my collection due to the fact that three grown children live in country areas abounding with a variety of specimens.

At the same time that a specimen is collected, notes should be made of the location, date and the growing situation (soil, shade, climate etc.) and some system should be instigated to enable the notes to be linked with the specimen, such as a numbered label.

As soon as possible after collection, the frond (and other material) should be placed between sheets of paper to dry out, so as to preserve, as much as possible, the original colour. Folded newspaper is suitable for this, using three or four sheets between each of the fronds. Be particularly careful when arranging the fern so that it sits flat without any wrinkles. At this stage the fern should be placed in a drying press or if one is not available, placed on a flat surface under a heavy weight. The newspaper should be changed every few days (as there is nothing worse than stale news*) to prevent any mould growing. Also better quality specimens are obtained if moisture is removed as soon as possible. After a week or two, drying should be complete and the ferns ready for mounting. This can be done using sheets of white paper or cardboard. Suitably sized sheets (27cms x 35 cms) are available in a Spirax Book No. 579. Alternatively the ferns could be kept in transparent plastic jackets or manilla folders.

The ferns should be arranged carefully on the paper and secured in place using narrow strips of adhesive paper or glued with a P.V.A. glue such as "Aquadhere". Arrange the specimens to display as many features as possible, e.g.



the front and the back of the fronds, fertile and sterile fronds, stipe hairs or scales, rhizome etc. Unusual aspects could be labelled using arrows to illustrate points of interest. The sheet is then covered with white paper and pressed until the glue is dry. Leave space in the lower right hand corner of the sheet for information about the specimen, showing botanical and common name, date collected, habitat and any other points of interest pertaining to the frond.

The completed sheet should be stored in a cool, dry place and inspected regularly for insect damage. To prevent this occurring the sheets could be placed in a deep-freeze (*in a sealed plastic bag, we presume.The production team*) at approximately -17°C for forty eight hours, repeating this process every six months.

*The corny bits should not be attributed to Dick - his typist (daughter) got carried away!

The main reference work for this article was "Collecting and Preserving Herbarium Specimens" by David Albrecht, published by the National Herbarium of Victoria and obtainable from their bookshop for (currently) \$10. Although not specific to ferns, the information is very comprehensive and halpful and there is a section on ferns. «



FRAMING YOUR PRESSED FRONDS.

Lyn Gresham

Another charming use for your pressed material is the arranging and framing of it for display in your home. You may wish to put single specimens on display, in which case written information except for maybe the name would probably be inappropriate. Or a collection of assorted fronds could be arranged attractively together in the one frame. Whichever style you decide on, drying, pressing and securing with P.V.A. (or spray glue as used for photographs) is as Dick has described above. Medium to heavy weight paper or light card, either white or coloured, would be suitable backing material. Alternatively, you may like to use silk or other fabrics (backed by card to provide a flat, secure surface) for this. Normal picture frames should accommodate your fern creations.

Any dried plant material will fade in time, much more rapidly if exposed to high levels of light, particularly sunlight, but if a suitable position is selected you will be able to enjoy your homegrown, homemade fern 'picture' for a very long time. -

FERNS DON'T LIKE IT ACID

Peter Hainsworth

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 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.

SPECIES	pH	\sim
Adiantum pedatum	7.0	
A. reniforme	6.0	
A. sylvaticum	6.0	
Asplenium oblongifolium	8.75	
Blechnum attenuatum	5.5	
B. spicant	5.5	
B. sp. (ex Page, New Caledonia)	5.5	
Coniogramme japonica	8.0	
Dryopteris aemula	6.5	
D. tokyensis	5.5	
Davallia tasmanii	5.75	
Dicksonia squarrosa	6.0	
Gymnocarpium oyamense	7.0	
Microlepia strigosa	5.5	

M. platyphylla	6.0	
Onychium japonicum	7.5	Take these as you find them. They are not intended
O. contiguum	7.5	to be authoritative, and it may well be that half a
Osmunda regalis	5.5	pH
Paesia scaberula	7.0	point difference either way would have given better
Polystichum monotis	6.75	results. I just hope that anyone struggling with one
^D . neolobatum	6.0	of these ferns might find a pH test provides the
^D . rigens	7.0	answer.
^D . squarrosum	6.75	
P. stenophyllum	7.0	Thanks are due to ex-editor Bob Lee for once again
P. tsus-simense	6.0	preparing articles for use in our magazine. He is
^D . venustum	6.0	responsible for the high quality of presentation of
Pteris vittata	7.0	both the above "Ferns Don't Like it Acid" and
Rumohra adiantiformis	6.5	"Iridescent Ferns and their Shady Behaviour"

WHAT TO DO ABOUT FERNS ADVICE TO NEW FERN ENTHUSIASTS

Welcome to the wonderful world of ferns! Feeling a bit confused? Not sure what ferns to choose for your first try at this fascinating form of gardening? Some ferns are trickier to grow than others. We'd like to try and save you from the disappointment (and expense) of trying the fanciest ones you can find, only to discover that they're tropical ferns and your shadehouse is definitely not tropical (or whatever).

Doug Thomas in his useful booklet "What to do about Ferns" has a few suggestions on the subject and these have been used as the basis for this article. The booklet is available from the Fern Society at a reasonable price.

NATURE - THE TEACHER.

If you can possibly manage it, take a picnic trip to one or more of our lovely rainforest areas close to Melbourne. Sherbrook Forest, Acheron Way, Cement Creek, Badger Weir, Mount Worth, Tarra Valley and the Otway Ranges are all places of great beauty, capable of providing great enjoyment and first class instruction.

In all these beauty spots ferns abound in lush variety. It is here close to creeks and moist areas that you will see the conditions in which they thrive.

We have several species of ferns which are easy to grow and as such would be ideal for the beginner. Some of these are:



FOR POT OR GARDEN CULTURE

1 Polystichum proliferum

Mother Shield Fern

This fern is frost hardy, prefers medium light and moist, well drained soil.

2 Pteris tremula

Tender Brake Fern

A large fern which tolerates some frost, this one appreciates high to medium light and moist soil. Mine is regularly attacked by caterpillars but bounces back beautifully when the tatty fronds are cut back.

3 Dryopteris affinis 'Cristata' Crested Shield Fern

This fern is medium sized, frost hardy and likes medium light. It is at its best when things are wetter than the previous ferns. It is everyreen.

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4 Adiantum raddianum

A Maidenhair Fern

A. raddianum is probably the most commonly grown Maidenhair in the cool temperate parts of Australia. It appreciates an open soil and added lime. Can grow to fill a large tub and only requires a top dressing of organic mulch or fertilizer in early spring to be a spectacular specimen. It is also suitable for a plastic hanging pot.

FOR GROWING IN HANGING WIRE BASKETS

1 Nephrolepis cordifolia cv. Plumosa Fishbone Fern

Likes low to high light, can get quite dry and survive but is at its best in moist soil. Even if frost burnt it will recover. Tough but showy.

2 Davallia mariesii

Hare's Foot Fern

A small, much admired fern, the Hare's Foot will send out rhizomes to eventually cover the outside of the basket. It can thrive for many years without repotting, in just moist, freely draining medium. Appreciates liquid fertilizer occasionally. Likes a sheltered garden spot where it will receive anything from low to high light. Probably the most usually grown Hare's Foot in temperate regions of Australia. Mine goes deciduous when subject to frost, looks dead and then revives when the weather improves.

3 Asplenium bulbiferum

Hen and Chicken Fern

Grown in low light and given sufficient water, this is a

lush, dark green fern with shiny fronds. Grown in high light it gets yellow and sick looking. It is semi hardy to semi tender and easy to grow. Plantlets form on the fronds and these can be rooted into the surrounding soil by layering (weighing down so they touch the ground).

4 Davallia pyxidata

Cup Hare's Foot Fern

This hardy Hare's Foot has coarse, leathery fronds and the rhizome always grows upwards. It is happy in any light level, freely draining soil and moist to dry conditions. Though a native of the east coast of Australia, it is rare in Victoria.

5 Polypodium formosanum Caterpillar Fern

Prefers medium light, well draining soil and moist conditions. Medium frost hardy, it has an alarming habit of shedding all affected fronds and staying bare for some time. As long as the rhizome is plump, it's

alive.

FOR GROWING IN TUBS FOR A YEAR OR TWO

1. Dicksonia antarctica

Soft Tree Fern

Give this one high to medium light, lots of water and quite heavy applications of (preferably organic) fertilizer and you may encounter two problems; damage by heavy frosts if uot in the garden and not enough room overhead to accommodate it!! Though much slower growing than the Cyatheas, the Soft Tree Fern is very long lived and will grow quite large and lush.

2 Cyathea cooperi

Scaly Tree Fern

This extremely variable Tree Fern thrives in Queensland and N.S.W. Frost tender when young, it prefers a moist spot and handles a quite exposed position when mature. Plant it and stand back!

Each fern in this list is really lovely in its own right, especially so when well grown. If you have success with these then go right ahead and add harder to grow species to your collection. If not, your fellow Fern Society of Vic. members will be happy to help you work out why - and then have another go.

Do not be impatient because scientific names have been used in this listing. There are many advantages in making use of these names. As your experience grows you will come to appreciate this. \ll

Opinions expressed in articles in this Newsletter are the personal views of the authors and are not necessarily endorsed by the Society, nor does mention of a product constitute its endorsement.

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LEARNING YOUR WAY AROUND FERNS 1. A FERN FROND. Lyn Gresham



In most of our ferns the fronds are the most prominent and admired feature - we admire them enough to buy a fern plant and try to keep it growing healthily. We use them to decorate and beautify our home and garden; the fronds are the bit we notice. The snails and caterpillars put them to much more practical use in my fernery, given half a chance; they nibble or devour them, depending, I suppose, on whether they like the taste or <u>really</u> like the taste. The frond is far more than just a pretty (or tasty) face, though. The fern collects and absorbs sustenance partly through its fronds, breathes through them, shades its roots with them and reproduces by means of spore which develop on the backs of them. Some ferns even produce new plants on their fronds.

Fronds are also very useful when we are trying to identify or describe ferns - but the strange words used in books, during talks at our meetings, on some plant labels and in conversation with the experts can be a BIT bewildering. Let's look at the general names used for various parts of a frond. Where more than one name is used for a part, alternative names are shown in brackets.

In our diagram a section of rhizome is shown, along with some roots, to represent the rest of a fern plant and to show how the frond is attached.

The costa (also called the midrib or midvein) is the 'stem' which runs from the rhizome right through to the frond tip, or apex. It is divided into two sections; the stipe and the rachis.

The stipe (or petiole) is the leaf stem, the bit before the costa branches off or the leaf begins. The part of this which is just near the rhizome is the stipe base. This is often thicker and usually carries hairs or scales more thickly than the rest of the stipe.

The primary rachis (main rachis or just rachis, also sometimes spelled rhachis, plural rachides*) is the part of the costa which runs through the leaf.

A finer 'stem' usually branches out from the primary rachis. It is called a secondary rachis (subrachis) and there

can be lots of them on each primary rachis.

A still finer rachis branching off the secondary one is called a tertiary rachis (costule).

On most ferns lots of tiny veins then branch off and form a vascular system all over the leaf blade(s).

Sometimes the leaf blade or **lamina** is attached directly to the primary rachis, right along the length of the rachis. It is then described as being **entire**.

A pinna (plural pinnae) is a leaflet attached to a secondary rachis. It also includes any leaflets attached to tertiary rachides which come from one secondary rachis. ("...that lived in the house that Jack built...")

A pinnule (plural pinnules. Seems too easy, doesn't it?!) is a leaflet which is atached to a tertiary rachis.

The tip of a frond is called the **apex (terminal segment)**. It is quite often mentioned in descriptions because in many ferns it is different to the rest of the frond and to its 'cousins' so is a useful feature to look for when deciding which member of a fern family you are looking at.

When you have developed a good knowledge of these and other botanical terms you will find it much easier (and briefer!) to make notes of your own ferns or those you see when you're in the field. If you are memory-challenged, to help to learn them you could photocopy this page - you have my full permission - and take it with you into the bush or use it in whatever way suits you.

JI

BUYERS' GUIDE TO NURSERIES.

VICTORIA:

Andrew's Fern Nursery / Castle Creek Orchids - Retail. Phone (03)5826 7285. Goulburn Valley Highway, Arcadia 3813 (20 km south of Shepparton). Large range of ferns and orchids for beginners and collectors. Open daily 10am - 5pm except Christmas Day.

Austral Ferns - Wholesale Propagators. Phone (03)5282 3084. Specialising in supplying retail nurseries with a wide range of hardy ferns; no tubes.

Coach Road Ferns - Wholesale. Phone (03) 9758 6878. Monbulk 3793. Retail each Saturday and Sunday at Upper Ferntree Gully Market (railway station car park) Melway Ref, 74 F5. Wide selection of native and other ferns. Fern potting mix also for sale.

Fern Acres Nursery - Retail phone (03)5788 5431. 1052 Whittlesea-Kinglake Road, Kinglake West 3757. On main road, opposite Kinglake Primary School. Specialising in Stags, Elks and Bird's-nest Ferns.

Fern Glen - Wholesale and Retail Phone (03)5629 2375, D & I, Forte, Garfield North 3814. Visitors welcome.

Kawarren Fernery - Wholesale and Retail. Phone (03)5235 8444. Situated on the Colac-Gellibrand Road, Kawarren (20 km south of Colac),

The Bush-House Nursery - Wholesale and Retail. Phone (03)5566 2331. Cobden Road, Naringal (35 km east of Warnambool), Ferns - trays to advanced. Visitors welcome.

NEW SOUTH WALES:

Jim & Beryl Geekie Fern Nursery - Retail. Phone (02) 9484 2684. 6 Nelson Street, Thornleigh 2120, By appointment.

Kanerley Fern Exhibition and Nursery - Wholesale and Retail. Phone (049) 87 2781. 204 Hinton Road, Osterley, via Raymond Terrace 2324. By appointment.

Marley's Ferns - Wholesale. Phone (02) 9457 9188. 5 Seaview Street, Mt. Kuring-Gai 2080. All Fern Society members welcome. By appointment,

QUEENSLAND:

Moran's Highway Nursery -Wholesale and Retail. Phone (07) 542 1613. Bruce Hwy, Woombye (1 km north of Big Pineapple: turn right into Kiel Mountain Road). P.O. Box 47, Woombye 4559.

