



Fern Society of Victoria Inc. **NEWSLETTER**



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FERN SOCIETY OF VICTORIA Inc.

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SUBSCRIPTIONS:

Single -	\$14.00	Pensioner/student	\$11.00
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Organisation	\$16.00		
Overseas -	\$21.00	- Payment by international bank cheque in \$A please.	
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Subscriptions fall due on 1st July each year.


Meetings are held on the third Thursday of each month except December and January at the Kevin Heinze Garden Centre, 39 Weatherby Road, Doncaster (Melway 47; H1).

* Please note that the Editor's address has changed.

OUR SOCIETY'S OBJECTIVES.

The objectives of the Society are;

- *to bring together persons interested in ferns and allied plants*
- *to promote the gathering and dissemination of information about ferns*
- *to stimulate public interest in ferns and*
- *to promote the conservation of ferns and their habitats.*

 Opinions expressed 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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CALENDAR OF EVENTS IN 2001

19th July monthly meeting

Forum: Our Problem Ferns

Competition category: Any problem fern—the sicker the better!

5 Minute Fern Talk: Terrarium update - Jack Barrett.



16th August monthly meeting

Our past president Chris Goudey

Making a Pressed Fern Collection

Competition category: Ferns in the Gleicheniaceae family

Coral Ferns, Fan Ferns and Ground Ferns (See Ian's column next page)

5 Minute Fern Talk: Jean Boucher



20th September

Annual General Meeting

And Election of Office Bearers

Followed by monthly meeting

Platycteriums and Drynarias

Ron Robbins is visiting from Adelaide

Competition category: Staghorns, Elkhorns and Drynarias.

There will not be a 5 minute talk due to the nature of the evening and our important speaker.



Excursion on Sunday 7th October

Kinglake

(See Gay and Barry Stagoll's article in last issue)

Meet at Fernacres Nursery at 10.30 a.m. This will be a Fern Society promotion day, open to the public. The going will not be difficult for people of average fitness so think about family, friends and garden clubs you could invite. More details soon.



Meeting programme

- | | |
|-------|--|
| 7.00 | <i>Sale of merchandise and Special Effort tickets. Also making library loans and lots of conversation.</i> |
| 8.00 | <i>General Meeting.</i> |
| 8.15 | <i>Workshops and demonstrations.</i> |
| 9.15 | <i>5 Minute Fern talk, Fern identification and pathology, Special Effort draw, Competition judging and results, Winner's tips.</i> |
| 9.45 | <i>Supper and another good yarn.</i> |
| 10.00 | <i>Close.</i> |

MAKE SURE OF YOUR MEMBERSHIP!

IF YOUR NEWSLETTER DOESN'T HAVE A FORM INSERTED, PLEASE PHONE OR WRITE TO BARRY WHITE (0337 9793) AND REQUEST ONE.



THE PRESIDENTIAL PROFUSION

Warm and ferny greetings from the chills of our Melbourne winter. At last we have been getting some worthwhile rain – after just 16 mm over 9 days

in May, we have recorded 93 mm over 10 days for June up to the 26th – our best monthly total since last October.

Please don't forget that we have a pressing need for a new editor. It would be very damaging for the society to get to the point where Lyn just can't continue and we have to run without a newsletter. If you have some time to spare each month, preferably (though not necessarily) access to a computer and the internet and an interest in learning more about ferns, then this may be the job for you. Lyn would give you all the assistance necessary to make the transition as easy as possible.

Our meetings in the last two months have gone well. I spoke in May on establishing a fernery in a sunny position. A number of people told me it was informative and enjoyable and one even asked if I would do it again (a glutton for punishment!!) Last month Bob Anderson didn't speak on landscaping with rainforest plants (OOPS!! – he did tell me but I forgot to put the change into the system). Instead he spoke about the plant highlights during the course of 12 months on his bush property on the outskirts of Healesville. It was a very enjoyable evening – I am sure that many of us were ready to pack our bags and move out there.

Our excursion to Kinglake is to be on Sunday 7th October. We will meet at Fern Acres Nursery in Kinglake West at 10.30 for morning tea. There will be more details in the next issue of the newsletter.

The committee has decided to enter the Melbourne International Flower and Garden Show hanging basket competition next year. It is only open to garden clubs and has some very worthwhile prizes. If you would like more information or want to be involved, speak to Barry White.

Patrick Brownsey has written a new book on the ferns of New Zealand. At this stage we don't know what the price will be, but if you may be interested in buying a copy let Barry White know. We will buy a copy for our library.

Don't forget that subscriptions are due. It causes some difficulties if you don't renew fairly promptly, so please see Lyn (who will be filling in for Don who will be

recovering from a hip replacement operation) at the next meeting or post them in as soon as you can.

Our Annual General Meeting will be held in September. Apart from Lyn wishing to stand down as editor, my three year term as president will have been completed. Nominations for those positions (and other executive positions or for the general committee members) will be gratefully received. You don't necessarily have to know a lot about ferns, but have a willingness to learn and to be involved.

For our July meeting, we will be having a forum on problems with ferns or ferns you have difficulty growing. Bring along anything that is causing you trouble or just bring your tale of woe – if you are bringing plants affected by pests or diseases make sure they are in sealed plastic bags. The competition will be any problem fern (the winner will probably be the deadest one!) Jack Barrett will be give the 5-minute fern talk. He will bring the terrarium he replanted as a demonstration at our Christmas meeting and we will have a discussion on what not to do with a terrarium (it's a likely candidate for first prize in the competition!

In August, Chris Goudey will give a talk on making a pressed fern collection. He also hopes to have a proper herbarium specimen to show us. The competition and display will be ferns in the Gleicheniaceae family – Coral Ferns and Fan Ferns etc. - and Ground Ferns – Hypolepis, Dennstaedtia, Calochlaena (Culcita), Pteridium and Microlepia etc. Jean Boucher will give the 5-minute talk.

In September, as well as our AGM, Ron Robbins will be coming over from Adelaide to share his experiences with Platyceriums and Drynariads with us. Please make sure that you come as it should be a really good evening.

We look forward to seeing you at the coming meetings.

Ian Broughton



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NOTICE OF ANNUAL GENERAL MEETING.

The twenty second Annual General Meeting of the Fern Society of Victoria Inc. will be held at 8.00 p.m. on Thursday the 16th of August 2001 at the Kevin Heinze Garden Centre, 39 Weatherby Road, Doncaster.

Business to be transacted will be:

1. To receive and deal with the President's Report on behalf of the Committee of Management.
2. To receive and deal with the Treasurer's Report.
3. The election of Office Bearers and Committee Members of the Committee of Management for 1997 - 98.
4. General Business.



Nominations for Committee of Management

Nominations are now called for the positions of Office Bearers and Committee Members for the year September 1997 to September 1998. Nominations should be in writing, be signed by the proposer and seconder, and include the written consent of the nominee. They must be received by the 9th August (not less than seven days prior to the Annual General Meeting). Nominations may be called at the Annual General Meeting only if insufficient have been received previously to fill all vacancies.

General Business

Items to be discussed and voted on under General Business at the Annual General Meeting must be notified to the Secretary in writing not less than 21 days prior to the meeting.

Ian Broughton
President.

Snippets From The Internet.

I believe the fern to which you are referring is *Didymochlaena Truncatula* (also called the maidenhair tree fern). If the name doesn't put you off to some of us it has another annoying little secret; it smells faintly as if a kitty has been incontinent in its vicinity. If you can't smell it, you are lucky. Just hope your friends have the same genetic advantage.

Duane Petersen USA

On that Maidenhair Tree Fern Thing--I've never detected an odor on mine, either; and I've been growing them for years. Maybe Duane's pets are attracted to them??

I presently have one standing at about 3 feet tall in a 3 gallon pot. They are absolutely fabulous, but tropical though a friend had one survive in the ground in zone 9 during the winter of '95. It didn't reappear until 1997. They like lots of water, though are pretty forgiving if dried out. A loose, well drained soil is extremely important as I have lost several large ones to root rot

when the soil broke down and turned to muck.
Mary Elliott South Louisiana USA Zone 8b

So is it settled the "Mahogany Fan" is a maidenhair tree fern? What makes a fern a tree fern? Mine is small, but seems to be growing from a crown, not from/as an even budding trunk.

Diann Barbee Thoma USA

Common names do not imply a scientific relationship. A starfish is not a fish, and so the maidenhair tree fern is about as untree fern like as you can get. Also, with common names you tend to get differing ones depending on the location, country, and time of day. In other words, common names are handy, but untrustworthy. That is why you find "maidenhair tree fern" and "mahogany fern" used for the same (smelly) fern. Me, I would call it the kitty litter fern, but what do I know?

*Duane Petersen
USA*

At our May meeting Ian Broughton presented a talk on
Establishing a Fernery
In a Sunny Position.

If you look at ferns in their natural habitat, you will notice that very few of them grow in very heavy shade or full sun. More often, they grow in filtered sunlight or in areas exposed to morning sun. Gardeners probably more often have disappointing results from overshadowing in their ferneries than from too much sun.

As far as sun goes, the best situation is in either morning sun, strong filtered light throughout the day or an hour or two of sun during the day. The afternoon sun in Summer in Victoria is too hot for many ferns to tolerate although, with care, some ferns may be grown successfully in full sun.

The secret is to get the other aspects of their culture right. The ideal conditions for growing most ferns would include strong filtered light; an organically rich and friable soil; mulch; moisture; and protection from excess wind. Most ferns will tolerate one, or maybe two, conditions that are less than ideal if the others are right. Exposure to sun is probably the easiest to work with, while soil is probably the most difficult.

SOIL

The first thing is to prepare the soil. Heavy soils can be fatal to ferns, combine them with exposure to sun and, instead of establishing a fernery you will have a very successful mortuary. However if you keep replanting regularly, you will develop an excellent relationship with your local nursery and keep the commercial fern growers very happy!



Sandy or poorly draining soils will also require improvement. With heavy or clay soils, the best thing would be to make a raised bed - 20 cm depth is ample for most ferns. If you have a large area to fill, try

contacting some of the smaller wholesale nurseries to see if you can take a trailer load or two of their used potting mix - we all have plants we discard. BUT, be careful of weeds and diseases!

If a raised bed is not an option then dig plenty of organic matter into the soil. Give some thought to what materials you use as some can have problems e.g. mushroom compost can sometimes have a very high pH, which is not good for most ferns.

SHADE

If the position is exposed to more than morning sun then establishing some shade is advisable. While some ferns will tolerate full sun they will never look as good as when they are more protected. They will probably be stunted, their foliage will tend to be quite yellow and it will probably burn.

Shade cloth (*refer to the separate section at end of article) is one obvious source of shade. One word of warning; the lighter colours, especially white, are brilliant for flowering plants but **not** ferns. If, however, there is other shade from trees or buildings (e.g. between a house and a solid fence) then the white shade cloth could be used as supplementary shade.

Another good source of shade, and a more natural one, is to plant some fast-growing large shrubs or small trees. Keep in mind that they may need to tolerate moist soil and a higher humidity. Some of the smaller wattles, bottlebrushes or Melaleucas, or even palms, could be used. Deciduous trees would be useful in that they would allow more light into the fernery in Winter, though of course they would not provide any frost protection.

A third option, in keeping with the fern theme, is to use some of the hardier tree ferns to provide the necessary shelter for less hardy ferns. The Rough Tree Fern (*Cyathea australis*) NSW Tree Fern (*C. cooperi*), the large, very impressive, robust, and quick growing Black Tree Fern (*C. medullaris*) from New Zealand, Norfolk Island Tree Fern (*C. brownii*) or the Highland Tree Fern (*C. tomentosissima*) a smaller growing tree fern from New Guinea can all be used. Don't forget that tree ferns will grow trunks and, over time, the area underneath them may become more exposed to the sun.

One of the nice things about growing ferns is that they do surprising things because they don't always know—or heed—the rules. I have had self-sown

(Continued on page 56)

THE FAMILY PARKERIACEAE

PARKERIACEAE is a mono-generic family. The genus used to be called *Parkeria*, but more recently it has been changed to *Ceratopteris*. This is a very small genus consisting of only four species, which are all aquatic ferns. It is therefore colloquially known as water fern or water sprite.

The genus name was derived from the Greek [*keras*] meaning horn and [*pterus*] meaning fern. This refers to the staghorn-like shape of the fertile fronds, which are much more delicate than the sterile fronds. All the species are notably dimorphic.

According to The Fern Dictionary, 1977, *Ceratopteris* is pronounced [ser a top' teris]. There is no fossil record of *Parkeriaceae* anywhere. It is therefore believed to be a family that developed fairly recently in the history of ferns. It dates more or less from the Cainozoic period. Although it is an advanced fern, it shares a number of characteristics with much more primitive ferns.

It is interesting to note that the sporangia are not borne in sori, but singly, on the underside of segments and are covered by the revolute margins. Sporangia are large and sessile. The spores can germinate under some depth of water.

These ferns are well-adapted to seasonal fluctuations in water levels. The fronds are floating, with the roots extended to the mud below. Plantlets are formed on

the leaves.

The life-cycle of this genus can be extremely fast. From spore to spore the life-cycle can be completed in only one month! In ordinary ferns, such as *Dryopteris*, it takes about three years to do this. These ferns occur only in the warm tropical areas of the world with altitudes between sea-level and 1000 metres. It is further restricted to areas with an annual rainfall of at least 400 mm. In winter they die back.

Ceratopteris is the only fern grown as a food crop. Plants are cultivated in rice paddies. In many countries it is either boiled and served as a vegetable or eaten raw as a salad. They say that it tastes much like lettuce, but slightly more nutty. These ferns are also often cultivated as aquarium plants. In warmer areas they can be kept outside in light shade. Indoors they do well if they get bright, but not direct, sunlight. The pH should be kept between 5.0 and 6.5. Daytime temperatures should not exceed 26° C (76° F) and night minimums no less than 15° C.

One often finds these ferns at pet shops who stock tropical fish. (I have done so here in Victoria, Australia. -Lyn)

The four species are *C. cornuta*, *C. delatoidea*, *C. pteridoides* and *C. thalictroides*. *C. cornuta* can be found in Southern Africa in KwaZuluNatal, Swaziland, Mozambique, Zimbabwe, the Caprivi Strip and the Okavango Swamps. However, in South Africa it is a rare fern, not often encountered in the wild.

*This article comes from Fernatix*za, Fern Society of Southern Africa monthly newsletter, January 2001 and is reproduced with thanks. D*

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Cyathea australis come up in my front garden which, though one of our common local tree ferns, will be cut very badly by a couple of -3° nights but *C. woolsiana* and *C. celebica*, both Northern Queensland ferns, both breeze through Winter with little or no damage! Rather ironic!

MULCH

Organic mulches, liberally applied twice a year, will be very beneficial for any fernery, especially one in a sunny position. As well as retaining moisture, the mulch will provide nutrients and humidity and also help keep the roots cool. At home, I have planted up large areas under mature eucalypts. I have put in raised beds of used potting mix over very poor clay soil. The gum trees have put their roots right through the beds and, during Summer, they take almost all the moisture. The ferns are thriving with most of their roots in the layer of accumulated mulch. Another way to retain moisture and keep roots cool in an exposed fernery is to use large rocks and plant the ferns with their roots underneath the rocks. There are many ferns that will grow naturally in such conditions even in very harsh climates; *Pellaea falcata*, *Doodias*, *Cheilanthes* and some of the *Blechnums* come to mind.

FEEDING

I never feed the ferns in the ground at home. With regular mulching, I find that they just don't need it. In pots ferns will appreciate regular feeding; half to two-thirds strength liquid fertilizers used regularly or slow release fertilizers can be used. I use Debcos Green Jacket slow release because it is neutral in its effect on soil pH. Some of the other slow release fertilizers tend to acidify the soil a little with each application and after three or four applications the pH can go as low as 4 to 4.5, which will be catastrophic for many plants.

WATER

Proper watering is vital for ferns growing in a sunny situation. Hand watering while having a long cold drink can be very relaxing after a hard day's work. Otherwise, a well-planned sprinkler system will be necessary. The range of micro-sprays now available is ideal for ferneries as they deliver a fine spray around the plants, which will increase the humidity and they can be easily set up to cater for the individual



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requirements of any area and of individual plants. They are also easily altered as the area develops - I have recently added extra risers to many of the sprinklers in my ferneries to raise them above the plants that have grown around them. One tip when using micro-sprays - a lot of people turn them on for only 5 or 10 minutes and think they have soaked the garden but because they operate on a very low water flow, for best results it is necessary to run them for about 25 minutes. Then the water will soak right through the root zone of the ferns, instead of having the surface wet but the deeper soil quite dry. Even in Summer, unless it is particularly hot and windy one thorough watering like that each day or possibly every second day should be more than enough to keep your ferns in prime condition without using an excessive amount of water. The best time to water is early morning or during the evening to reduce the risk of burning the fern foliage and to reduce water loss from evaporation, BUT if the plants need to be watered in the middle of the day then just do it! - it is far better to have a few fronds burn a little from being watered while the sun is on them than to have all your ferns die because you didn't want to water them while they were in the sun. We never water at a set time each day, it is always at need so when the temperature is in the mid to high 20's, the ferneries would normally be watered about three times in four days even with the competition for water from the eucalypts.

Sprinklers should be set so they deliver water in droplets, not mist. If you want to humidify the atmosphere, use a fogger fitting on your hose rather than mist through your irrigation system.

WIND

Protection from strong wind in summer will also be important as sun and hot wind are a very damaging combination for ferns. The combined drying effect will make it almost impossible to keep any fern looking good. A solid 'wall' of any material will tend to compress the wind and increase its damaging effect as it is forced around the wall. Better to break the wind enough to neutralize damage but still allow air movement. Two layers of shade cloth are often the answer.

ACCLIMATIZATION

Before planting ferns in a sunny position they may need to be acclimatized. From mid-autumn to mid-spring, there shouldn't be any problem planting them straight out in the sun. During the warmer months,

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because most ferns will have been grown in a shadehouse or hothouse, it will be necessary to harden them by gradually exposing them to more sun over a few weeks - take care with watering and shade the pots during this period! When planting, avoid the middle of a hot spell and try to plant straight after a cool change, when the plants will have a few days of cooler weather to settle in to their new position.

THE FINAL WORD . . .

or, IAN'S LAW ON FERNERIES

When developing any fernery, it is absolutely essential that you find a large slab of rock with a

suitably sized shallow depression in the top and then place it in a suitably shady corner of the fernery and regularly take a long cold drink, sit on the rock and enjoy your own piece of heaven. We have many birds enjoying the coolness and moisture in our ferneries, and greedily devouring the smorgasbord they provide. Among many others we get Yellow Robins, a few different Thornbills, Tree Creepers, Pardalotes (which nest in earth banks—or my piles of bulk potting mix), Rosellas (that defoliate some of our tree ferns) and Fantails. I have even had a Tree Creeper land on my leg while I was watering recently - doesn't that make a fernery a very worthwhile investment?

FERNS THAT MAY BE GROWN IN A SUNNY POSITION

The following ferns may be grown in a sunny position, those marked with an asterisk can be successfully grown in full sun if the advice given above is followed. Other species from the list could be tried and some experimenting could be worthwhile.

Tree ferns:- **Cyathea australis*

**Cyathea brownii*

**Cyathea cooperi*

**Cyathea medullaris*

**Cyathea tomentosissima*

Adiantum hispidulum

Asplenium goudeyi

**Blechnum cartilagineum*

Blechnum minus

Blechnum nudum

**Cheilanthes austrotenuifolia*

**Cheilanthes distans*

**Cheilanthes myriophylla*

**Doodia aspera*

Doodia media

Dryopteris affinis cv. *Cristata*

**Dryopteris cycadina*

**Dryopteris erythrosora*

Dryopteris marginalis

**Gleichenia microphylla*

**Histiopteris incisa*

**Hypolepis glandulifera*

Microlepia speluncae

**Notholaena* spp

**Osmunda regale*

**Paesia scaberula*

**Pellaea falcata*

Pellaea ovata

Polystichum proliferum

Polystichum retroso-palaceum

**Pteris tremula*

Pteris umbrosa

**Pyrosia lingua*

**Pyrosia rupestris*

**Rumohra adiantiformis* - Cap Form

Selaginella sp

**Sphenomeris chinensis*

**Todea barbara*

Woodwardia orientalis

Rough Tree Fern

Norfolk Island Tree Fern

NSW (or Scaly) Tree Fern

Black Tree Fern

New Guinea Highland Tree Fern

Rough Maidenhair

Lord Howe Island Bird's Nest Fern

Gristle Fern

Soft Water Fern

Fishbone Water Fern

Rock Fern

Bristly Cloak Fern

Central American Lace Fern

Prickly Rasp Fern

Common Rasp Fern

Crested Male Fern

Shaggy Shield Fern

Autumn Fern

Marginal Shield Fern

Coral Fern - needs to be kept wet

Bat's Wing Fern

Downy Ground Fern

Cloak Ferns

Royal Fern - needs to be in a wet position

Ring Fern

Sickle Fern

Scrambling Silver Dollar Fern

Mother Shield Fern

Australian Brake

Jungle Brake

Japanese Felt Fern

Rock Felt Fern

Giant Leathery Shield Fern

Bronze Feather

Fijian Lace Fern

King Fern

Oriental Chain Fern



Establishing a Fernery in a Sunny Position continued; THE USE OF SHADECLOTH.

The following information emerged during an impromptu discussion at the meeting. There seems to be enough valuable 'food for thought' in it to make a separate article, thereby avoiding unbalancing Ian's treatment of the subject at hand.

The quoted shade factor is for UV, not visible, light. 70% black and white shade cloths will both give 70% shade of UV light but in the spectrum range of visible light the black will give about 65% shade while the white will only give about 35% shade. Therefore, it can be said that in general, black or dark coloured shade cloths are preferable to light coloured ones.

The light under the white shade cloth (though great for flowering plants because they admit visible light containing the whole colour spectrum) would be too harsh for most ferns. However, if there is other shade from trees or houses then white can be used as supplementary shade. A certain amount of shade can also be provided by hanging pots of less shade-loving ferns or other plants (perhaps flowering) from the roof of your fernery.

The other property of white shade cloth which should be considered is frost protection—an extra 2-4° over other colours. I think that this is because when the sun shines on it white transmits more visible light

which then heats up the air, soil and plants beneath it and then at night or during overcast weather, because it is reflective, it reflects some of the warmth back in and the cold out.

Probably the pinks would be the best of all. Tests done in Israel on horticultural plastics found that pink produces high levels of photosynthetically active radiation (PAR -the portion of the sun's radiation spectrum that best promotes photosynthesis, thus plant growth).

Dark green I personally would not use. It produces low levels of PAR. Green fibreglass, which was widely embraced thirty or so years ago (when it was first available), was found to send ferns white, presumably for the same reason. However, many of us have very successful ferneries covered with it. It must be said that some ferns are more sensitive to the effect of both the intensity and PAR of light than others.

I would be interested in seeing what a combination of 50% black over 50% white would do. Would it screen out just enough visible light and just enough ultraviolet light?

If you intend using polycarbonates, fibreglass or similar products in any of the solid colours, you would be well advised to use opal because the white component of these products has a UV blocking property which the clear ones do not have. ☒

HUMAN HEALTH RISKS FROM SPORES - A REVIEW

The authors of this article in the Fern Gazette 1999, (Vol.15, part 8, pp. 275-278) were exceedingly industrious to dig out some 60 references to this subject. A few were concerned with effects on humans directly, but mostly with experimental work on laboratory animals on simply on the extraction of damaging or possible damaging materials from ferns, which do not differ in this respect from other garden plants and vegetables. I have not so far found any allergic reaction to ferns or fern spores myself but having much first-hand experience of the incredible potency of allergens in Himalayan Primulas and a few other plants, this is something well worth looking out for (itchy finger; I recommend the use of plastic or rubber gloves for handling plants so identified).

The article worries me not a little for its possible effect on the spore exchange and for fern popularity generally. It is also the sort of thing that the media exploit for their own ends. Skimming through the article for its salient points could well make some people never touch a fern again. But, in fact, the only experimental work giving detail quotes mice being force-fed 0.2 gm of bracken spores on 10 occasions. A mouse (at least our highland mice) weighs about 20 gms, which means a hundredth part of its body weight in spores was force

fed on each occasion. Brought up to a human scale a rather small person of 50 kilos (110 lbs) would have to be fed a plateful of 500 gm or about 1 lb of bracken spores at each meal of a plant already known to be poisonous. The marvel is that the mouse survived this treatment at all. I am sure that we wouldn't. So although these experiments may prove a point it is not a very practical one. When figures of aerial spores are mentioned we start with a negligible few hundred spores near particular fern plants to tens of thousands in sporing bracken stands. This latter is about the same sort of scale as grass pollen and could trigger the same sort of reaction. It has not so far been demonstrated although the writers are looking into it. Living in what is arguably the most fern infested part of Britain I have yet to hear of anyone complaining.....

As far as collecting and packeting spores for the exchange is concerned I shall not be taking any extra precautions.

We get enough "contaminants" in our spores as it is, so any collectors who raise clouds of spores around their heads while packeting we would rather not know about.

Source: Pteridologist Volume 3: Part 5: 2000 p111.
Used with thanks. ☒

COMPETITION WINNERS

May meeting - a Xerophytic fern

Competition

1st	Don Fuller	<i>Notholaena sinuata</i>
2nd	Jack Barrett	<i>Cheilanthes myriophylla</i>
3rd	Keith Hutchinson	<i>Pteris tremula</i>

Exhibitors' Draw Jack Barrett

Special Effort Lyn Gresham, Barry White, Fran Harrison, Geoff Harding, Brenda Girdlestone.

June Meeting - any fern that looks good!

Competition

1st	Geoff Harding	<i>Davallia pyxidata</i>
2nd	John Hodges	<i>Platynerium bifurcatum</i> ssp. <i>vetchii</i>
3rd	Ian Broughton	<i>Cyathea rebecca</i>

Exhibitors' Draw Jack Barrett

Special Effort Gwen Barrett, Dick Kissane, Diana Mayne, Mavis Potter, Brenda Girdlestone.

April Winner's Tips On Growing Nephrolepis Fishbone ferns.

The winner was Don Fuller, who must be congratulated on a remarkable effort only days after having been extremely involved with organising and running the Fern Show.

I think a Nephrolepis is a great plant for a sunroom or well-lit porch. Provided it has plenty of sunlight and warmth it is an easy fern to grow as it will not need much looking after.

Nephrolepis need PLENTY OF LIGHT, so I have mine in plastic hanging pots, hanging right up high where the light streams through the clear cover of an igloo and above my Maidenhairs, which like the same conditions but less light.

The secrets to watering Nephrolepis are DON'T KEEP THEM WET and NO OVERHEAD WATERING. Water the soil, not the fronds. This is particularly important for the ones that have congested fronds and/or growth habit. They don't need a lot of water; the best method of watering is to give them a thorough soaking and then let them dry out a bit before the next water.

WARMTH is a very important factor. I have

some of my best specimens growing on a semi-enclosed terrace which faces north and is an effective sun-trap.

Good AIR CIRCULATION is important. One problem you could encounter if there is not enough air circulating is mealy bug. This is very difficult to eradicate - much better to get the air movement and humidity right. Prevention is certainly better than cure in this case.

REPOT your Nephrolepis during their growing season (from about Christmas time on), not in winter or spring. I grow them in my home-brewed potting mix which is the one in Doug Thomas' booklet, "What to do about FERNS"* with modifications, depending on the availability of ingredients. I apply a bit of Osmocote, and Maxicrop at the beginning of the growing season.

*Available from the Society.

A Horsetails' Tale

Robbin C. Moran
The New York Botanical Garden

"I have never seen anything which so much astonished me," wrote Richard Spruce, Yorkshireman, botanist and perhaps *the* greatest botanical explorer of the nineteenth century. What astonished Spruce, who had seen a lot of amazing things while botanizing in the Green World of Amazonia for 15 years, was a stand of giant horsetail (*Equisetum*) near the village of Canelos, Ecuador, in the early 1860s. Here is his description:

the most remarkable plant in the forest of Canelos is a gigantic *Equisetum*, 20 feet high, and the stem nearly as thick as the wrist! . . . it extends for a distance of a mile on a plain bordering the Pastasa [river] but elevated some 200 feet above it, where at every few steps one sinks over the knees in black, white, and red mud. A wood of young larches may give you an idea of its appearance. . . . I could also fancy myself in some primeval forest of Calamites, and if some gigantic Saurian had suddenly appeared, crushing its way among the succulent stems, my surprise could hardly have been increased¹

The horsetails Spruce was familiar with in his native Yorkshire grew less than one meter tall. Now he stood among horsetails towering six meters tall, reminding him of the calamites, the extinct cousins of the horsetails that flourished in the swamps of the Carboniferous Period 345 to 280 million years ago (Fig. 1). The calamites soared to 20 meters tall - taller by far than any horsetail today. Spruce's comment about "some gigantic Saurian" refers to amphibians, the dominant land animals of the Carboniferous, which undoubtedly once thrashed their way through the dense thickets of these plants. Is it possible that Spruce *did* find a calamite, a plant thought to have gone extinct about 250 million years ago?

The only other person who claims to have seen a truly gigantic *Equisetum* was Édouard André a French botanist and explorer. He travelled to Ecuador in the 1870s and reported seeing huge plants near the town of Corazón on the western slopes of the Andes. His book about the trip illustrates the plants as several times taller

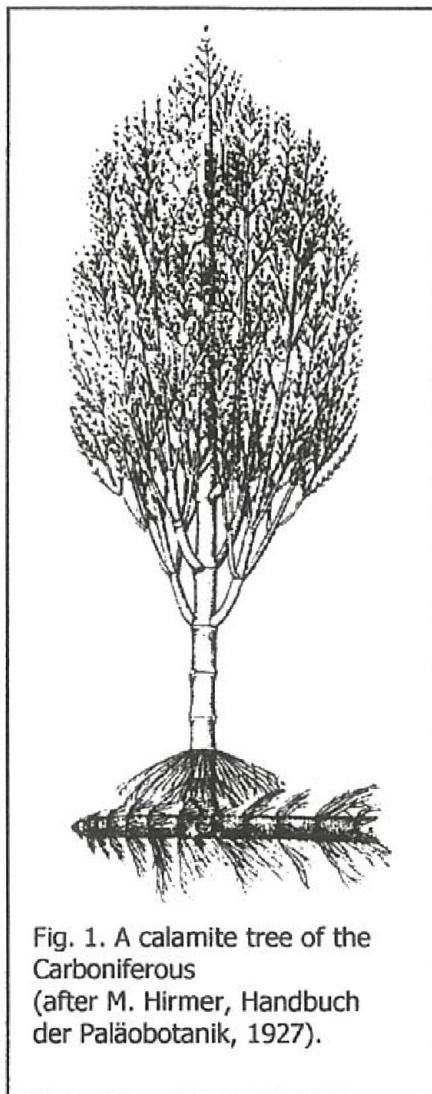


Fig. 1. A calamite tree of the Carboniferous (after M. Hirmer, *Handbuch der Paläobotanik*, 1927).

than a man on horseback-- much larger than any *Equisetum* known today (Fig. 2). Although the illustration is delightful, André did not collect a voucher specimen to document it, and his claim is taken by professional botanists as it should be - *cum grana salis*. The cynic might even suspect that André intentionally exaggerated the size of the plants to sell more copies of his book and impress readers.

Spruce, however, must be taken seriously. He was a careful and painstaking observer, a botanist of first-rate. Unfortunately we'll never know exactly what he saw because he also did not collect a specimen (unlike André he had good reason not to²) But it's possible to guess what he saw by considering a few facts about horsetails and calamites.

Horsetails and calamites differ from other plants by the presence of round, hollow, jointed stems. These can be easily pulled apart at the joints into separate, cylindrical segments - an activity that children and adults find amusing. The stems are green, carrying out nearly all of the plant's



Fig. 2. "The giant horsetails of Corazón." Drawn by Riou, based on a sketch by Édouard André, from "L'Amérique Équinoxiale," Part 3, pp. 385 to 400, in *Tour du Monde*, 1883, Paris.

photosynthesis, and they grow in an unusual manner. Like other plants, their growth in length or height comes from the activity of an apical meristem, a group of actively dividing cells at the stem tip. Unlike other plants, this apical meristem gets smaller each time a new stem-segment is produced, resulting in narrower and narrower segments, until the apical meristem is used up, and growth ceases. This mode of growth is referred to as "apoxogenesis," and horsetails are the only modern-day plants that have it.

Horsetails and calamites are also characterized by unleaf-like leaves. These are borne in whorls at the stem joints and are not spaced individually along the stem. The leaves of each whorl fuse laterally to form a sheath surrounding the base of the stem-segment above (Fig. 3). The sheath resembles the main stem, but its leaf-like origin is revealed by the presence of leaf tips that appear as teeth along the top edge of the sheath. In some species, such as the winter scouring-rush, *Equisetum hyemale*, these tips fall away early and are therefore absent.

Besides distinctive stems and leaves, horsetails and calamites bear their spores in cones produced at the tips of the stems or branches. Each cone is composed of many tightly fitting, polygonal scales attached to a central axis (Fig. 4). On the inner surface of the scale are several oblong yellowish sporangia filled with green, photosynthetic spores. When the spores are ripe, the central axis of the

cone elongates, separating the scales and exposing the sporangia to the air. Upon drying the sporangia split lengthwise and expose the spores to the air, allowing them to be carried away. The spores are helped on their airborne journey by four strap-like structures called 'elaters' that catch the wind. The elaters coil and uncoil in response to changes in humidity. When the air is dry they extend outward and create wind resistance so that the spores drift aloft (Fig. 5). When the air is humid, they coil around the spore so that buoyancy decreases and the spore drops - with luck onto moist soil where it can germinate. Elaters occur only in horsetails and calamites and are evidence of the close relationship between these plants.

Although *Equisetum* and calamites share many distinctive characteristics, they differ in two respects. First, calamites bore modified leaves, called bracts, within their cones. Such bracts are absent in *Equisetum*. Second, calamites became tree-like by widening their stems through secondary growth. *Equisetum* lacks this ability, which is why its species remain relatively small (basically, *Equisetum* is the primary plant body of a calamite³). Despite these differences, the two groups are much alike.

Species of *Equisetum* have common names based on whether they produce whorls of branches from the stem joints. Those with unbranched stems (Fig. 6) are called "scouring rushes", referring to their use in scrubbing pots and pans. The plants are perfect for this use because their stems are roughened with tiny bumps of silica⁴. They also conveniently occur along stream and riverbanks where pots and pans are washed. Nowadays their stems are used to sand the reeds of woodwind instruments. The species with branched stems are called "horsetails" because of the bushy appearance imparted by the whorls of branches. It was a horsetail that Spruce saw near Canelos, as is evident from his comparison of the

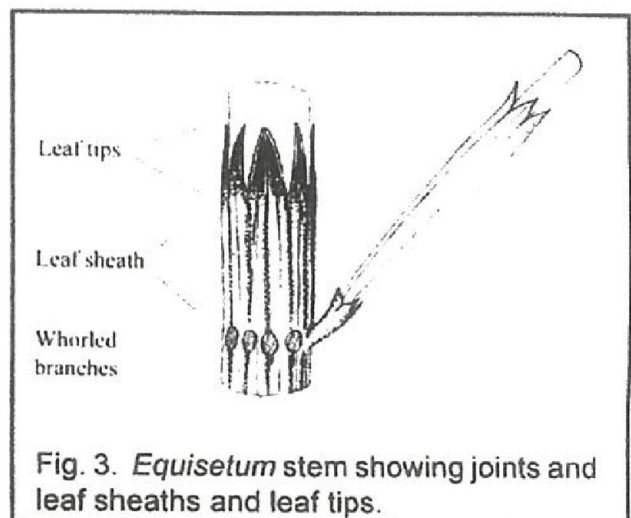


Fig. 3. *Equisetum* stem showing joints and leaf sheaths and leaf tips.

plants to larches (*Larix*) which also bear whorled branches.

It's hard to believe that Spruce found a calamite. These plants have not appeared in the fossil record for the last 250 million years--about half the time that plants have existed on earth. It's unlikely that calamites would have persisted all that time without a trace, especially because they grow in environments where fossils frequently form, such as swamps and marshes.

What, then, did Spruce see? South America harbours three species of *Equisetum*, all of which occur in Ecuador.⁵ Two of the species grow at middle to high elevations in the Andes and are therefore unlikely to have been seen by Spruce in lowland Amazonia. But the third species, *Equisetum giganteum*, occurs in Amazonia and grows to heights of five meters (about 15 feet) and widths of 13 millimeters (about half an inch). As the specific epithet implies, it's the largest species in the genus (Fig. 7). Could this have been what Spruce saw? Spruce's description of the plants' height (20 feet) is taller than that recorded for *Equisetum giganteum* (about 15 feet), but within a reasonable margin of error considering that he was giving only an eye-ball estimate. His estimate of the stems being "thick as the wrist" is, however, much more than the 13 millimeters recorded on the largest plants today. Although Spruce was not prone to exaggeration in his botanical work, in this case he was probably so impressed by the plants' height that he overestimated their dimensions.

It's most likely that what Spruce saw was only a robust healthy stand of *Equisetum giganteum*. Yet in my more romantic, irrational moments - usually while standing in a patch of horsetails, pulling apart the stems joint by joint - I like to imagine that he did find a population of calamites and that those magnificent plants are not extinct after all, but hiding somewhere deep within Amazonia, awaiting discovery by some intrepid botanical explorer. And why not? The Ecuadorian Amazon is poorly explored. Benjamin Øllgaard, my colleague at Aarhus University in Denmark, is the only pteridologist who has ever collected in the southern region of Ecuador near Canelos and his trips there have been short and few. Who knows what undiscovered plants still lurk there?

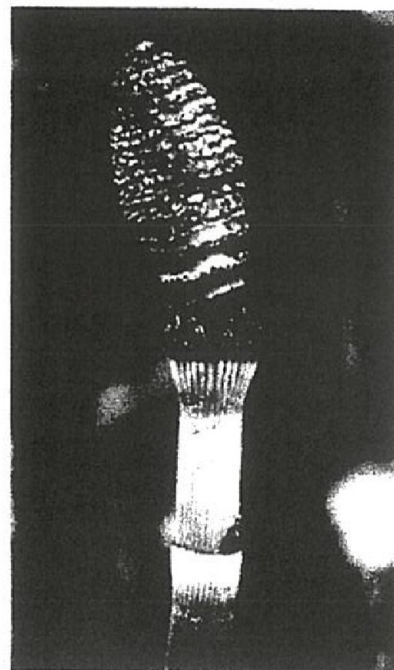


Fig. 4. Cone of a scouring rush (*Equisetum hyemale*). The central axis of the cone has elongated separating the scales (sporangioophores) that bear the sporangia. The small whitish structures attached to the scales are the sporangia.

Selected References and Notes

¹ Spruce's description of the giant horsetail comes from his book about his travels in Amazonia. This book, a collection of Spruce's botanical papers, letters and geographical articles, was assembled and edited by his friend, Alfred Russel Wallace, into a two-volume work: *Notes of a Botanist on the Amazon and Andes: Being Records of Travel on the Amazon and its tributaries the Trombetas, Rio Negro, etc. during the years 1849-1864*. Macmillan & Co. Ltd, London 1908. See pages 205 and 208 for a description of the giant horsetail.

² Spruce was a tireless collector who sold dried, pressed plants to herbaria in Europe as his main source of income. He probably did not collect the giant horsetail at Canelos because he was on an urgent mission - at Her Majesty's behest - to reach the western slopes of the Andes in southern Ecuador. There he collected the seeds of wild quinine trees (*Cinchona* spp.) and smuggled them out of Ecuador aboard a British ship headed for India. The seeds were the starting stock for the extensive quinine plantations

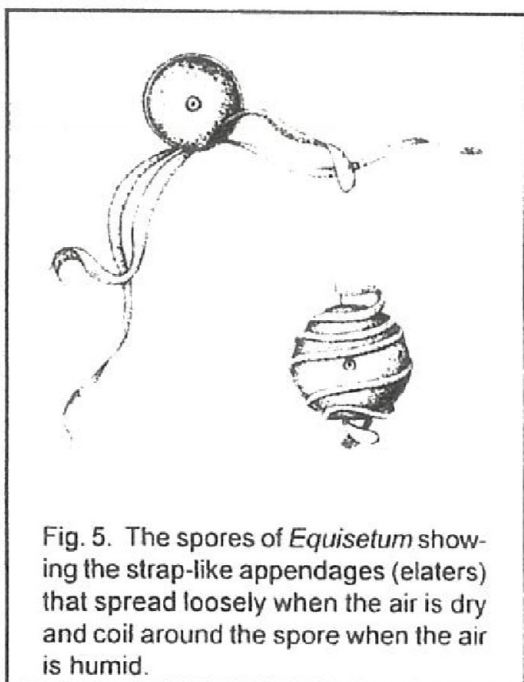


Fig. 5. The spores of *Equisetum* showing the strap-like appendages (elaters) that spread loosely when the air is dry and coil around the spore when the air is humid.

(Continued from page 62)

developed in India, Sri Lanka, and elsewhere. These plantations yielded medicine to fight what was, and still is, one of the world's most widespread and debilitating diseases: malaria. Even today, malaria afflicts about 100 million people around the world, and each year in Africa alone it kills about one million children.

³ It's possible that the calamites still exist in a genetic sense, latent within *Equisetum*. Secondary thickening fails to occur in *Equisetum* although it occurred in their calamite ancestors. Is it possible that genes for cambial activity are still present only dormant and unexpressed, in modern-day *Equisetum*? Perhaps with a little genetic engineering we could learn how to turn on these genes and produce a modern-day version of a calamite.

Because of their large size and clonal growth habit, the calamites might well have had the most massive sporophytes that ever existed, easily rivaling the current record for the most massive organism in the world: a grove of quaking aspen (*Populus tremuloides*) in the Wasatch Mountains of Utah. This grove covers almost 43 hectares, consists of more than 47,000 tree trunks, and has been estimated to weigh about 6 million metric tons. Just as this colony has grown from thousands of suckers from the same root system, so too could the calamites have spread to form extensive colonies from their underground rhizome system.

⁴ The stems of *Equisetum* are roughened by many minute bumps or spines of silica, which is why they feel rough to the touch and make a good abrasive. You can see the silica deposits by looking at a stem from the side with a hand lens. The silica bumps or spines are on the ridges of the stem, and if you look in the valleys between the ridges, you can see whitish dots - the stomata - arranged in lines.

In general, the scouring rushes 'behave' differently than horsetails (subgenus *Equisetum*). They hybridize readily, forming sterile offspring with intermediate characteristics. Hybrid horsetails, on the other hand, are rare.

In North America, a hybrid that is common and widespread is Ferris's scouring rush. It results from a cross between the winter scouring rush, *Equisetum hyemale*, and the smooth scouring rush, *E. laevigatum*. Although sterile because it has aborted spores, Ferris's scouring rush propagates readily from stem segments that root at the joints. This form of vegetative reproduction enables it to grow in regions where one or both of its parents are absent.

⁵ The number of species in most groups of organisms increases from the poles toward the equator. This is life's major geographical pattern and is called the "Latitudinal Diversity Gradient." There are of course, exceptions to this pattern, and *Equisetum* is one of them (*Salix*, the willow genus, is another). Only three species of the *Equisetum* occur in South America and four occur in Central America, but North America north of Mexico has eleven. Another peculiarity about the distribution of *Equisetum* is its absence from Australia and New Zealand even though it is common elsewhere in the world. □

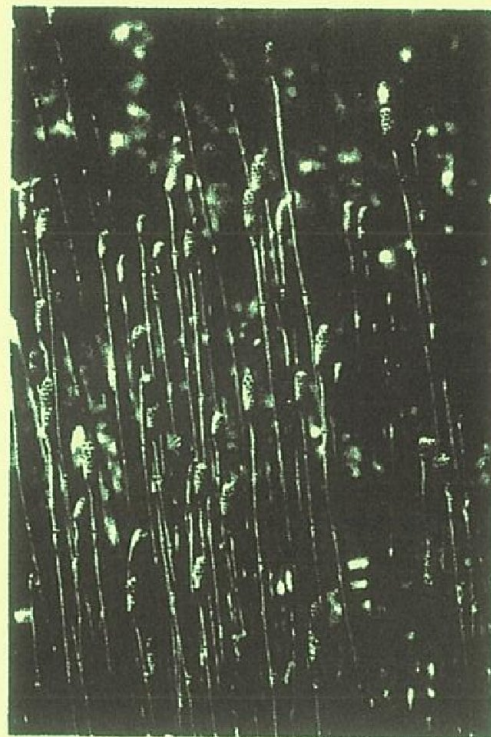


Fig. 6. The unbranched stems of a scouring rush (*Equisetum laevigatum*). Note cones at their tips.



Fig. 7. Botanist Axel Poulsen holding a giant horsetail (*Equisetum giganteum*) in Ecuador.

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