THE FERN SOCIETY OF VICTORIA Inc.

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NEWSLETTER

VOLUME 18, Number 2

March / April, 1996

FERN SOCIETY OF VICTORIA Inc.

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SUBSCRIPTIONS:	Single -	\$15.00	(Pensioner/Student - \$11.00)
	Family -	\$18.00	(Pensioners - \$13.00)
	Overseas -	A\$30.00	(by Airmail)
	Subscrip	tions fall d	ue on 1st July each year.

PRESIDENT'S MESSAGE:

It is Autumn already; my how the year is flying.

At our February meeting we reluctantly accepted the resignation of our Newsletter Editor, Bob Lee. Bob has served on the Committee in various positions for the past twelve years, including President and Immediate Past President, with ten years as Chairman of the Show Committee and the last five years as our Newsletter Editor.

We spent considerable time at the general meeting, trying to find a replacement for Bob. Lyn Gresham has kindly volunteered to give it a try, but being a country member it is going to cause many problems for her. If anyone can assist in any way, please talk to one of our Committee members. This will be Bob's last Newsletter and we wish him well for the future.

Mary Frost spoke on the "Preparation & Presentation of Ferns for the Show Bench" and we all learnt a great deal about this important subject. Mary is organising a group tour for eleven days to

Carnarvon Gorge and Fraser Island on the l0th June, 1996. If you are interested in this tour, please contact Mary by telephone on (057) 26 9287. I have not been to Fraser Island, but I have been to Carnarvon Gorge and it is a fascinating place of great natural beauty with many rare ferns, palms and cycads.

Barry White will be speaking on his trip to the Philippines at our next meeting. Lorraine and I visited there last year, so I am sure his talk will be most enjoyable.

Everything is progressing well with the Fern Show; I hope your ferns are looking good. The new venue is larger, so we will need more ferns than usual for the display. Unless you wish to have your ferns judged, it is not necessary to have your ferns up to Mary Frost's standard. This year there will be an added bonus: on paying admission everyone attending our Show will receive a free fern.

Chris Goudey

FORTHCOMING MEETINGS

(1) THURSDAY - 21st MARCH, 1996

Topic: Philippines Visit

Speaker: Barry White

(1) THURSDAY - 18th APRIL, 1996

Topic:

Demonstrations

- Potting Mixes

- Propagation by Division
- Growing from Spore
- Mounting Stags and Elks

Speakers: Society members

VENUE: The Theatrette Inglesby Road, Camberwell. (Melway Ref. 59 K2 - see Jan./Feb. Newsletter for further directions)

MEETING TIMETABLE:

Pre-meeting Activities:- Sales of Ferns, Spore, Books and Special Effort Tickets. Library Loans. 7.30 p.m. 8.00 p.m. General Meeting Topic of the Evening 8.30 p.m. 9.30 p.m. Fern Competition Judging Fern Identification and Pathology Special Effort Draw 9.45 p.m. Supper 10.00 p.m. Close FERN COMPETITIONS (1)March -A Blechnum (2)April -A Pteris Lindsaea caudata

SPEAKER REPORT - GENERAL MEETING, 15TH FEBRUARY 1996

Preparation and Presentation of Ferns for the Show Bench.

Speaker: Mary Frost

Mary is an accredited horticultural judge, a qualification which requires two years of study with the Australian Judges Association, followed by regular refreshers. She gave us an entertaining and instructive talk on methods of preparing ferns for show so as to meet the rules for competition judging.

Mary handed out to the members present a sheet summarising the main points of her talk. The following is a copy of that sheet with some amplification to include other points made during the talk and later discussion.

There are three important points to remember:

- 1. The container no matter whether it is plastic, terracotta, wood, treefern - MUST be clean, and this includes hanging saucers. Black plastic pots can be cleaned with soap and water, allowed to dry, then rubbed with baby oil. Putting a dirty or ugly pot inside a good one for the competition is not allowed.
- Potting mix if visible must be clean no weeds, algae, mosses or snail shells or snail pellets. There should be no roots protruding from the bottoms of pots.
- The plant must be clean with no diseases and no broken fronds. All broken fronds should be removed completely by cutting off very neatly at soil level. Judges are allowed to check the middle of the ferns.

If your pot plant has passed these three points you are well on the way to winning a prize.

Other points to check:

- The plants should be showing new growth and be planted in the centre of the pot
- The plant and container should be in visual balance; plants should not appear to be under- or over- potted.
- All plants should be circular in shape unless habit dictates otherwise. The fronds should be even all the way around the pot, not leaning in one direction as this indicates not enough light or poor growing conditions. To prevent plants from growing lopsidedly they should be rotated a quarter turn every few days.

• If plants are to be shown in hanging containers watch what the schedule calls for:

a "fern in a hanging container" can be any kind of fern BUT for

a "hanging fern in a hanging container" the fern MUST hang at least 9" from the top of the container.

- Unless a specific type is called for, a hanging container can be of any shape or material (plastic, terracotta, wood, board, treefern) but must show visible signs of how it hangs rope, wire, chain, etc.
- If the schedule calls for one fern, you must check to see that it has only one crown in the pot. Many *Nephrolepis* send up suckers from the stolons but this is the growth habit so it is judged as one fern.
- *Davallia* must be checked for dead ends on the rhizomes. This happens when they run down around a basket, hang down and eventually die. Cut back to a healthy offshoot.
- Elks and Stags should have no plants growing behind them, including mosses. Wherever possible all signs of how they are attached to the board or treefern slab should be hidden.
- Water ferns thoroughly the day before so they don't drip all over clothes and floor causing hazards (*and probably annoying the judges*!).
- Plants should be labelled with a very neat label with clear lettering, unobtrusively placed and oriented so that it can be easily read - but NOT A NURSERY LABEL. For a hanging fern, the label can be attached to the hanger if desired.

Happy Showing and good luck to all exhibitors.

It is important to decide well in advance which plants you are going to show so that they can be properly groomed. If you are planning on showing plants regularly, it is a good idea to experiment to see how long it takes a plant to develop a complete new set of fronds after being cut back to soil level. Cutting fronds right back to soil level normally produces no problems with disease. With some ferns, such as Davallias with a fleshy rhizome, it can be an advantage to dust the cut ends with Mancozeb or sulphur to inhibit fungal disease.

One of the points that Mary made was that judges do not have any discretion in applying the rules by which plants are judged. Hence it is important that the organisers of a competition specify the categories exactly. Judges are not allowed to take the degree of difficulty in cultivation between different varieties into account in their comparisons.

At the end of the talk, Don Fuller on behalf of the Show Committee emphasised that the strict standards of judging which Mary spoke about apply only to ferns specifically entered in the competition at the Show. Members should not be discouraged from bringing their ferns to the Show for use in the display. Minor defects can easily be hidden in a mass display and as many ferns as possible are needed to fill the display area.

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COMPETITION RESULTS

Congratulations to the following winners of the Fern Competition and the Special Effort draw for the February meeting. The Competition was judged by Mary Frost.

FERN COMPETITION: (Category - Nephrolepis)

First:	Nancy Perry	Nephrolepis	exaltata	'Verona'	(with high commendation)
Second:	Dorothy Forte	66	"	'Lady M	axine'
Third:	Jack Barrett	66	66	'Irish La	ice'

SPECIAL EFFORT: Dorothy Forte, Garnet Frost, Reg Kenealy, Mary Frost.

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TRIP TO CARNARVON GORGE AND FRASER ISLAND

Mary Frost, who is a frequent traveller to distant fern areas both in Australia and overseas, brought with her to the February meeting some brochures describing an eleven-day coach trip to Carnarvon Gorge and Fraser Island with much of interest en route.

The trip starts on Monday, 10th June and costs \$!,495 per person twin share with a \$200 discount for pensioners. The price includes all accommodation (motels and lodges), meals, admission fees, tours and cruises in the itinerary and travel insurance. A deposit of \$100 per person is required to confirm a reservation with the balance paid six weeks before departure.

Briefly, the route to be followed is along the Newell Highway through Forbes, Parkes, Warrumbungle Ranges, Coonabarabran and Moree, crossing the Queensland border at Mungindi and then on to Roma. Carnarvon Gorge is reached on the morning of the third day. Two days are spent there exploring the Gorge with its massive sandstone walls, aboriginal art and abundant fauna and flora (including *Angiopteris evecta*) before proceeding through Emerald along the Capricorn Highway to Rockhampton, Gladstone and Hervey Bay, whence a ferry is taken to Fraser Island. Three nights are spent on Fraser Island which is the world's largest sand island and has freshwater lakes, crystal-clear freshwater streams (one through rainforest where *Angiopteris evecta* can be seen), magnificent beaches and coloured sand cliffs. The last two days are spent on the homeward trip via Maryborough, Gympie, Nambour, Toowoomba, Goondiwindi and Dubbo.

The trip is operated by Gordon Cardwell's Travel of 39 McDonald Street, Numurkah, Victoria 3636. Phone contact numbers are (058) 62 1833 or 1800 033 068. The brochure mentions starting the tour from "your nearest major town" but gives no details.

FERN SHOW - 1996

SATURDAY, 30th MARCH - SUNDAY, 31st MARCH

Don Fuller

Just a reminder that by the time you receive this Newsletter the Fern Show will be very close, and I hope you are busy grooming your ferns for the Show. The talk at our February meeting given by Mary Frost was very informative on this subject.

The details of the Show are given in the January/ February edition of the Newsletter but I wish to emphasise that the success of the Show needs <u>your</u> <u>participation</u>, so please come along and bring your best ferns.

Please continue to publicise the Show to your friends and any appropriate groups. Additional flyers are available if required.

We would still like to hear from people able to assist in the running of the Show, particularly anyone willing to give a demonstration.

With regard to the Fern Competition details listed in the last edition, please note that "Category 5 -Platycerium" includes both plants with a single crown (as in *P. superbum*) and those with multiple crowns (as in *P. bifurcatum*).

Those wishing to sell ferns are reminded that they need to obtain a "booking in" form before the Show. These can be obtained at the March meeting or by contacting Bernadette Thomson on (03) 9399 1587. Ferns for sale must be clearly labelled with their botanical names and growing conditions

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MURRINDINDI EXCURSION

Barry White

The Society will be holding an excursion to the Murrindindi area, just north of Melbourne, on Sunday 21st April. We had a trip to this area in May 1993 but it had to be cut short because of persistent rain.

We will meet at the Toolangi store, Melways Directory Map 282, ref. R12, at 10.00 am. The easiest route to Toolangi is through Yarra Glen, but it may also be reached through Healesville or Kinglake or down through Glenburn.

It is proposed to go via Sylvia Creek Road to the Wirrawilla Reserve near the junction with Hardy Creek Road, where there is a special fern walk which is very nice. We will then proceed on to the Murrindindi Cascades picnic area. From the picnic area a track leads down and across a series of footbridges over the river at the base of the cascades. The scene is framed by beautiful trees including Myrtle Beech and Sassafras, as well as ferns and mosses. The return walk is about 600 metres and normally takes about 20 minutes. The next stop will be the Wilhelmina Falls picnic area. The walk to the Falls is along a well-graded track, rocky in places, and will take about two hours for the 3 km return trip. There are fewer ferns in this area but the walk is through attractive bushland and there are some good patches of *Sticherus* at the top of the 75-metre falls.

From the Wilhelmina Falls you may wend you own way home. The easiest route would be to continue along to Devlins Bridge and down through Glenburn. Those going near Kinglake should take the opportunity to call in at Kevin and Gloria Tinker's nursery which is about 1 km west of the turnoff to the Kinglake National Park and Masons Falls, and is on the right hand side as you head towards Kinglake West.

It is proposed that the Society build up information on the fern species in the various areas of the State. Therefore, we will be endeavouring to get as accurate information as possible on the ferns observed during the trip. A copy of Duncan and Isaac "Ferns and Allied Plants of Victoria, Tasmania and South Australia" and a hand lens will be useful tools. The following article is taken from the December 1995 issue of the Bulletin of the Australasian Native Orchid Society Victorian Group Inc., which acknowledges the original source as Australian Horticulture, August 1993. David Nichols is Technical and Research Manager with Debco Pty. Ltd. at Tyabb in Victoria.

THE MERITS OF PEAT

David Nichols

QUESTION: What is it that makes peat moss so special in horticultural use?

ANSWER: To answer that we really need to clarify what peat moss is in the first place. The word moss can be critical to the definition. If we simply use the word peat then we are talking about a wide range of materials produced in bogs. The plant matter from which the peat is formed can vary from mosses, through reeds and sedges to trees and shrubs. The properties of the peat vary accordingly. If we are talking about peat moss then we ought to be referring only to those peats which are largely derived from sphagnum moss.

The bench mark is traditionally taken to be light, recently dead sphagnum peat with very little decomposition and plant parts recognisable. This was considered by Puustijarvi (1973) and others in Europe and North America to be the ideal growing medium when used by itself. It has a very high water holding capacity, high cation exchange capacity and much more air porosity than soils and soil-based mixtures that were previously used. This type of peat is also biologically active and contains disease suppressing organisms.

There are two other important features to note about

peat moss. The water in the peat will rise upwards through the media by capillary action giving a more even distribution from top to bottom of the container. Secondly, much of the water in the peat is loosely held and easily exploited by the plant. This means that the plant can take up water and nutrients more efficiently provided that the water is regularly re-supplied.

Negative properties

Paradoxically these latter effects detract from the apparent water holding properties because plants tends to wilt faster in peat moss (see chart).

The reason for this is that some of the water moving upwards through the media is lost by evaporation from the surface, whilst the water easily obtained by the plant is quickly lost by transpiration.

The major negative property of peat moss also relates to water. When dry it becomes hydrophobic or water repelling. This is aggravated because peat moss shrinks as it dries and water applied at the surface runs down the sides of the container. This is overcome by the use of appropriate wetting agents.

The discerning nurseryman will make the most of





the good properties of peat moss and its limitations with proper management. His frustration is in trying to find and select the product that matches this concept of "special". Peat moss supplied to Australian growers comes from a number of sources and is a variable commodity. Producing countries have different species of sphagnum and the peat formed from them is layered at varying depths with considerably differing properties. Furthermore it may undergo inconsistent processes of drying and screening after harvest.

While peat moss can still be considered a quality product we are now seeing far better substitutes coming onto the market than have been available previously.

Reference: Puustjarvi V., *Peat and its Use in Horticulture*, (1973) (English translation William G. C. Krause) Liikekirjapaino Oy Helsinki {1977).

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Sphagnum: the basis of life in a bog

The May 1988 issue of "New Scientist" magazine contained an article about the decline in the peat bogs on the moors of northern England. Basically this is occurring because sphagnum moss, the most important peat-forming plant in bogs, can no longer grow there because of airborne industrial pollution (soot and acid rain).

The article contained the following insert about sphagnum moss and its part in the formation of peat bogs:

Bogs form in areas with high rainfall and low temperatures. Under these conditions, little water evaporates or is taken up by plants, so the copious rainwater washes out (leaches) nutrients from the soil. Even without pollution, rain is acidic because it dissolves carbon dioxide from the air. This acidity makes it particularly effective at dissolving basic substances and nutrients in the soil, which plants need to grow. The result is a leached, acidic soil, very low in plant nutrients, in which only bog and moorland plants can thrive.

The most remarkable of these plants is sphagnum moss. There are about 60 species of sphagnum in Europe, although they all look similar to the untrained eye. Sphagnum grows in wet acid conditions, and, once established, it tends to retain the water and maintain the acidity. It does this in two ways. First, the plant is designed like a sponge with thousands of tiny cavities that hold water and prevent the plant from drying out. Secondly, sphagnum produces acidity by releasing hydrogen ions. It may do this to make the conditions less suitable for competing plants. Certainly. the plants which grow in this often waterlogged, acid habitat have to be adapted to it.

One consequence of the acidity of bogs is that the bacteria which normally break down dead plant matter cannot thrive: this dead material, mostly sphagnum, does not decay but builds up in an ever increasing layer, forming peat.

Peat bogs are remarkable habitats but, in Britain at least, we do not seem to appreciate them. It may be a case of familiarity breeding contempt, as 13 per cent of the world's blanket bog is in Britain. Sphagnum is the basis of all life in the bog: the other plants and animals depend on it and the peat. Once removed it cannot be replaced, as the climate today does not seem to allow peat to re-form.



Sphagnum recurvum acts as sponge for water and nutrients

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The following article is taken, with thanks, from the Newsletter of the Fern Society of South Australia, Feb./March 1996.

Potting Soils - You Get What You Pay For.

Trevor Norman

It is always hard to pay \$5.00 or more for a bag of potting soil when there are plenty of alternatives for \$2.00 a bag, but the extra expense is well worth it. I fell for the trap of buying a cheap potting soil recently and have regretted the decision from the moment I opened the bag. Instead of being the normal black colour of composted material, this potting soil was white, being mainly made up of raw wood chips.

Nevertheless the fern was potted on and watered in with liquid fertiliser as I knew the manufacturer would not have added any fertiliser in order to keep costs down. One week later the fern looked washed out and in need of a good dose of fertiliser and it now had some companions in its pot - a crop of small toadstools. It s good to see that something got some benefit from the fertiliser. I should have predicted this of course, as back in the days when I did Agricultural Science we used raw organic matter to induce extreme nutrient and in particular nitrogen deficiencies in fertiliser trials. When raw organic material is kept wet, the number of micro organisms such as bacteria and fungi increases exponentially and absorb all the available nutrients. leaving none for plants. In fact the number of micro organisms is limited only by the available nutrients. Adding liquid fertiliser only serves to increases the number of microbes and seems to make the problem worse.

Of course the manufacturer was thinking of the consumer when producing this "quality product".

Realising that the composting of the wood chips would make the potting medium acidic, a liberal amount of gypsum had been added to keep the pH neutral. In this respect it had worked, but unfortunately the qualities of gypsum which make it ideal for road construction had now become evident. Within a week the potting soil had set like concrete and held together by the mycelial hyphae of the fungi (the toadstools). Any water put on the surface was taking about 30 minutes to soak in. I was committed so I persevered. I found I could water effectively by soaking the pot in a bucket of water or liquid fertiliser. Two months later the toad-stools stopped coming up and after four months the fern actually started to become green again and lose its washed out appearance. After about six months it was actually back in the condition it started out in, although still set in "concrete", and is now starting to make some progress. Thank goodness it was hardy.

Overall I have paid a hundred fold in lost time for the few dollars I saved in not buying a better quality potting soil in the first place and can only recommend that others don't fall into the same trap. Be prepared to pay a few extra dollars and try to examine the soil before buying it. One can usually find a bag in the stack which has a torn out corner and is spilling its contents. Examine this material and make sure it is well composted and preferably has a slow release fertiliser added. Within a month of potting on, the benefits of a better quality potting mix will be evident.

(Short accounts such as the above about practical experiences in fern growing are ideal material for a Newsletter like ours - and there must be plenty of our own members who have experiences and information worth sharing. Please consider whether some aspect of your own fern activities, either fern growing (successes and failures are of equal interest), fern areas you have visited or anything else of general interest could be the subject of a short article - and then DO SOMETHING ABOUT IT. If you do not have time to write a finished article, brief notes will be happily accepted. - Ed.)

Reproductive Systems in Asplenium flabellifolium, the Necklace Fern

Helene Laws

The Fern Life Cycle

Most fern enthusiasts are familiar with the alternation of generations which is characteristic of the life cycle of ferns. A spore produced by the sporophyte generation (the plant we recognise as a fern) germinates to form the small, often heart-shaped prothallus which is the gametophyte generation. Male and female sexual organs are produced on the underside of the prothallus and the union of a sperm with an egg results in a new sporophyte plant. Each cell nucleus of the sporophyte generation carries two sets of chromosomes, the "2n" number; the number in each set is known as the "n" number and is characteristic for the particular species. During all normal growth, cells divide by mitosis in which the chromosomes split longitudinally and separate, the nucleus of each daughter cell having the same chromosome number as the parent cell. During spore formation a particular sequence of two divisions occurs, in which four cells result, each having a single set of chromosomes, the n number. This is known as meiosis. In the first division of meiosis similar chromosomes of the two sets come together to form pairs (bivalents) and it is at this stage that the chromosome number is most easily determined. The chromosome pairs separate, each member to a different nucleus; a second division, similar to mitosis, follows to give the four daughter cells.

In the developing sporangium of most higher ferns the central cell divides by mitosis to give two cells; three more synchronous mitoses give 16 spore mother cells, each of which undergoes meiosis. Thus a mature sporangium usually has 64 spores each with the n chromosome number. The prothallus which develops from a spore also has the n number of chromosomes, as do the eggs and sperm it produces. Union of the egg nucleus with that of the sperm restores the 2n number which is characteristic of the resulting sporophyte.

The Apomictic Ferns

A number of ferns have abandoned sexual reproduction. The term **apomixis** applies to any form of reproduction which <u>replaces</u> a normal sexual

cycle. A number of more specific terms may be used for such reproduction: apogamy (no sexual fusion), diplospory (production of spores without a reduction chromosome number) and agamospory in (reproduction with neither sexual fusion nor reduction of chromosome number at spore formation). In ferns which reproduce apomictically spores are formed without the normal halving of the chromosome number so that the resulting prothallus has the 2n number. Young sporophytes then develop directly from the prothallus and if sex organs form at all they are non-functional. The term agamospory is the one most recently used for the ferns although apogamy was commonly used in the older literature.

Two differing methods of apomixis have been described for the higher ferns. Irene Manton, in her epic work on Problems of Cytology and Evolution in the Pteridophyta (1950), described apomictic reproduction for a number of British and European ferns including members of the genera Pteris, Cyrtomium, Dryopteris, Pellaea and Asplenium. All these show what is now described as the Döpp-Manton system of agamospory. A modified mitosis occurs in one of the cell divisions which lead to the formation of spore mother cells. The chromosomes divide but fail to separate into two daughter cells, resulting in the formation of a cell which carries twice the number of chromosomes usual for the sporophyte. Thus, these apomicts have only eight spore mother cells instead of the usual sixteen. A normal meiosis follows and 32 spores are produced but because the total chromosome number has just been doubled the spores have the 2n chromosome number. They germinate to produce a 2n prothallus from which a young sporling grows directly. This is the method found in the majority of apomictic ferns.

The second system of apomictic reproduction has been observed in only a few fern species, three of which are found in Australia: *Asplenium aethiopicum*, *A. flabellifolium* and the filmy fern *Gonocormus proliferum*. *A. aethiopicum* from Africa was studied in detail by A. F. Braithwaite (1964) and this kind of apomictic reproduction is now termed the Braithwaite system of agamospory (Walker, 1985). In this system 16 spore mother cells are formed as is



usual for sexually reproducing species but meiosis is modified (chromosome pairs fail to form and separate) so that the chromosome number is not reduced and each spore mother cell produces two spores rather than four. Mature sporangia thus have 32 spores (or sometimes fewer due to irregularities in the meiotic division).

Chromosome numbers in Asplenium

The **basic** chromosome number for a group of plants (eg. genus, family, etc.) is known as the "x" number and is the lowest n number found in that group. For example, x=22 is the basic number for the family Osmundaceae (*Todea, Osmunda and Leptopteris*),

and in this family all naturally occurring species in which the chromosomes have been counted have n=22. In Asplenium, and indeed in the family Aspleniaceae, x=36. More than half the northern hemisphere species for which chromosome numbers are known have n=36; these are diploid species. Each sporophyte plant has a total of 72 chromosomes in each cell nucleus; it has two sets of the haploid number (the n number) for that particular species, i.e. 2n=72. The chromosome number of a plant is generally expressed as n=36 if the count was made observing chromosome pairs at meiosis or as 2n=72 if the number was counted observing single chromosomes, eg, chromosomes at mitosis in a root tip cell or the unpaired chromosomes in the modified meiosis of an apomictic species showing the Braithwaite system. Many members of this genus, especially southern hemisphere species, have chromosome numbers which are multiples of the basic number. Patrick Brownsey (1977) found, in his studies of the genus Asplenium in New Zealand, that A. flaccidum and A. obtusatum are tetraploid with n=72, A. terrestre is octoploid with n=144, and A. trichomanes is both tetraploid with n=72 and hexaploid with n=108. This last species which is known to be diploid (n=36) and tetraploid (n=72) in Europe and the U.K., has also been recorded as diploid and tetraploid in Australia.

Asplenium flabellifolium

Asplenium flabellifolium, the Necklace Fern, is a very distinctive Asplenium which is confined to New Zealand and the south eastern and south western part of Australia. In New Zealand it occurs from Invercargill in the south to North Auckland, but is absent from western parts of both islands. In Australia it is known from South Australia to south eastern Queensland, and from south western Western Australia. In 1973 John Lovis showed Australian material from the A.C.T. to be apomictic with failure of chromosome pairing at the first division of meiosis. Patrick Brownsey (1977) has verified this for a number of New Zealand collections.

I have recently studied meiosis and spore formation in a population from a sheltered forest gully on Mt. Wellington near Hobart and found to my surprise that meiosis is normal and each sporangium has 64 spores. This is a sexual population of A.



flabellifolium! Braithwaite (1964) showed for A. aethiopicum in Africa, a mosaic of sexual and apomictic populations. He also determined from chromosome counts that the apomictic populations were octoploid and 10-ploid. Previous workers had found sexual populations in A. aethiopicum to be tetraploid, octoploid and 12-ploid. Brownsey has shown that apomictic populations of A. flabellifolium in New Zealand have two different chromosome numbers, 2n=210-211 and 2n=277-280, the lower number comparing with that found in Australia by Lovis (1973). These observed numbers correspond to approximate hexaploid and octoploid levels. The difficulties of counting so many chromosomes are quite considerable and accurate counts are often not possible. Chromosome counts which I have made to date on the Mt. Wellington sexual population suggest an approximate 12-ploid number of n=200-206 (an exact 12-ploid would have n=216).

Braithwaite, in his studies of A. aethiopicum found a marked difference in spore shape between sexual and apomictic plants. Spores from sexually reproducing plants were bean-shaped while those from apomictic plants were almost spherical. Similarly, in the Mt. Wellington plants tho spores are bean-shaped. Preliminary studies show that bean-shaped spores and a count of 64 spores per sporangium are also characteristic of a few of the Tasmanian Herbarium collections which I have checked so far: specimens from Mt Victoria in the north east of Tasmania and from King Island. However, the majority of collections, including some I have recently made from more exposed sites higher on Mt. Wellington, show spherical spores and where it can be determined, approximately 32 spores per sporangium.

The few observations to date raise a host of questions. Are all the populations showing bean-

shaped spores reproducing sexually? This needs to be checked from chromosome studies at meiosis, from spore numbers and from the presence of viable sex organs on the prothallus and the origin of the new sporophyte. What chromosome numbers do the apomictic populations have, are there varying levels of polyploidy as in the New Zealand populations, and are all the sexual populations 12-ploid like the one from the forest site on Mt. Wellington? Is it possible to distinguish apomictic from sexual populations by characters of the sporophyte plant, and do the apomicts and sexual populations have differing habitat preferences? The answers to these questions will give some understanding of the reproductive systems of *Asplenium flabellifolium*.

References:

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WANTED: Asplenium flabellifolium

Barry White

Helene Laws is very interested in furthering her study of *Asplenium flabellifolium* and is anxious to obtain further samples from the field. Any material of *A. flabellifolium* would be most welcome, whether it be dried or fresh or spores; young plants which can be grown on would be ideal. The most important thing is to have accurate locality data especially whether from forested or exposed sites.

Helene's address is 75 Wellesley Street, South Hobart, Tasmania 7004. It is good to see this type of work being done on Australian ferns and I urge members to support Helene in her work.

The following article is copied, with thanks, from the Newsletter of the Western Australian Fern Society Inc., December 1995.

Polystichums

Helen Morehead

POLYSTICHUM (po lis'ti kum - many rows)

The genus consists of about 175 species which occur almost world-wide. In general, they are hardy ferns and a number are found in such areas of severe winters as Europe, North America and New Zealand. One species (*P. aculeatum*) which does not occur in Australia is widespread around the world and probably consists of a number of subspecies. Its identity has led to much confusion and at one stage, Australian species were assigned to this complex.

There are four species in south-eastern Australia and all are endemic. They are *Polystichum australiense*, *P. fallax*, *P. formosum* and P. *proliferum*. A further species (*P. fragile*) has been named from the highland rainforests of northern Queensland but is still under study.

Polystichums are extremely variable ferns - from fine and tripinnate to simple and straplike. Many species produce proliferous buds on the tip of the upper surface of their fronds, which grow into separate plants under the right conditions.

P. andersonii (Anderson's Holly Fern).

A soft scaly fern which occurs from the northwestern coast of America to Alaska in cool damp woodlands and moist rocky slopes. This species has a tufted rhizome and long narrow soft pinnatifid fronds, which are densely covered with soft pale scales. Hardy in a fernery or moist sheltered cool garden. Propagated easily from bulbils.

P. australiense (Australian)

A coarse leathery species from New South Wales, which grows mostly in fairly open forests. It is a large fern with dark-green leathery two- to threetimes pinnate fronds. This fern spreads by means of proliferous bulbils which appear at the apex of each frond. A hardy species, which is not often cultivated.

P. formosum (Beautiful)

The Broad Shield Fern is an attractive finely divided species which occurs from south-eastern Queensland

to eastern Victoria. Throughout its range, this fern favours damp rocky situations, quite often on or at the base of cliffs. It is a medium sized species with hard three-times pinnate fronds and small sharply toothed segments. A hardy fern for a fernery or moist sheltered garden.

P. lentum (tenacious, tough)

A cool climate fern from the Himalayas. This species has an erect caudex with long narrow leathery pinnate to pinnatifid fronds. It spreads by means of proliferous buds, which appear on the tip of each frond, to form large colonies. A very hardy species for a sheltered, moist garden or fernery.

P. munitum (of the sea)

This species occurs from California north to Alaska where it grows in moist shaded woods and sheltered mountain slopes. It has a slow-creeping rhizome and long narrow dark shiny green bipinnate fronds. A hardy species for a fernery or cool sheltered moist garden.

P. proliferum (bearing buds) (Mother Shield Fern)

An extremely variable species from New South Wales, Victoria and Tasmania, where it grows in mountain rainforests. This species has a thick ascending scaly rhizome and large leathery darkgreen two- to three-times pinnate fronds. The Mother Shield Fern produces plantlets on the tip of each frond and often on each pinna, which, under ideal conditions, take root to form large colonies. This fern is widely cultivated throughout south-eastern Australia and New Zealand. It is an attractive and very hardy species for a garden or fernery.

P. retroso-paleaceum

A hardy Japanese species which is widely cultivated in Australia and New Zealand. This fern forms an attractive crown of deep, glossy-green soft bipinnate fronds. The frond bases and new crosiers are densely covered with large pale brown scales. A hardy evergreen species for a sheltered, moist garden or fernery.

P. richardii

A small hardy, distinctive fern which is widespread throughout New Zealand in fairly dry open forests. This species is quite variable throughout its range, with deeply lobed pinnate or bi-pinnate fronds, which are tough, leathery and a deep glossy, almost bluegreen in colour. It grows best in the garden and quite often dies if grown in a container.

P. setiferum (Soft Shield Fern)

The Soft Shield Fern is widespread throughout Britain and Europe, where it is common in damp sheltered woodland, particularly in valleys and along the edge of watercourses. It is a large fern with long arching bipinnate fronds, which are soft to touch. A very popular species for a fernery or garden, with many choice cultivars, some of which produce bulbils along the midvein of the frond.

P. standishii (previously Arachniodes standishii) (Upside-down Fern)

Native to Japan and Korea and is well known in cultivation as the Upside-down Fern. The whole frond seems to be upside-down and even the sporangia are visible through the lamina from the upper surface. It is a large-growing species, that spreads fairly rapidly into sizeable clumps. This fern grows equally well in cool climates and tropical regions.

P. tsus-simense

This fern is a neat compact species, native to China, Korea, Japan and Taiwan where it grows in moist shaded woodlands. It is a small fern with glossy bluegreen bipinnate fronds, which grow to about 30 cm tall. This fern is a hardy species for a fernery or sheltered moist garden.

P. whiteleggei

Endemic to Lord Howe Island. It is a large species with broad triangular, deep glossy-green three times pinnate fronds. In its natural habitat, it grows in moist sheltered forests and in cultivation is suited to a glasshouse or protected fernery.

Information taken from "A Handbook of Ferns for Australia and New Zealand" by Christopher J. Goudey and "Australian Ferns and Fern Allies" by D.L. Jones and S.C. Clemesha.

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FERN BOOKS IN PRINT

Ivan Traverso

(continued from January/February issue)

A List of the Ferns of Simla & North Western Himalaya. H. F. Blandford. 1978 Scholarly Publications Trade Cloth ISBN 0-88065-065-6 (Today & Tomorrow Printers & Publishers) Reprint 22p. \$2.00

Handbook to the Ferns of British India, Ceylon & Malaya Peninsula with Supplement. R. H. Beddome. 1977 Scholarly Publications

Trade Cloth ISBN 0-88065-054-0 (Today & Tomorrow Printers & Publishers) 502p. \$ 20.00

The Pteridophyte Flora of Fiji. G. Brownlie. (Beiheft zur Nova Hedwigia Ser.) (No. 55) 11/1977 Lubrecht & Cramer Limited Library Binding ISBN 3-7682-5455-0 \$ 120.00

Common Ferns of Luquillo Forest. Angela K. Kepler. 1975 Inter American University Press Trade Cloth ISBN 0-913480-06-1 125p. \$ 15.00. Trade Paper ISBN 0-913480-08-8 125p. \$ 5.00

Ferns of the Vicinity of New York.John K. Small.Trade PaperISBN 0-486-23118-6Dover Publications Inc.Reprint02/1975288p.\$ 5.95Trade ClothISBN 0-8446-5244-XPeter Smith Publisher Inc.(date not supplied)\$ 9.00

(to be continued)

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.

BUYERS' GUIDE TO NURSERIES

VICTORIA:

Andrew's Fern Nursery / Castle Creek Orchids - Retail. Phone (058) 26 7285. Goulburn Valley Highway, Arcadia 3613 (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 (052) 82 3084. Specialising in supplying retail nurseries with a wide range of hardy ferns; no tubes.

Coach Road Ferns - Wholesale. Phone (03) 9756 6676. 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 (057) 86 5481. Kinglake West 3757. On main road, opposite Kinglake West Primary School. Specialising in Stags, Elks and Bird's-nest Ferns.

Fern Glen - Wholesale and Retail. Phone (056) 29 2375. D. & I. Forte, Garfield North 3814. Visitors welcome.

Kawarren Fernery - Wholesale and Retail. Phone (052) 35 8444. Situated on the Colac - Gellibrand Road, Kawarren (20 km south of Colac).

The Bush-House Nursery - Wholesale and Retail. Phone (055) 66 2331. Cobden Road, Naringal (35 km east of Warrnambool). Ferns - trays to advanced. Visitors welcome.

NEW SOUTH WALES:

Jim & Beryl Geekie Fern Nursery - Retail. Phone (02) 484 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. Closed Thursdays and Saturdays. Groups of more than 10 must book in advance, please.

Marley's Ferns - Wholesale. Phone (02) 457 9168. 5 Seaview Street, Mt. Kuring-Gai 2080. All Fern Society members welcome. By appointment.

QUEENSLAND:

Moran's Highway Nursery -Wholesale and Retail. Phone (074) 42 1613. Bruce Highway, Woombye (1 km north of Big Pineapple; turn right into Kiel Mountain Road). P.O. Box 47, Woombye 4559.

