

MICROSCOPE. It has been decided to purchase a microscope for use of the Spore Bank Curator. This will ensure that all spores are checked before despatch and are of good quality. The microscope will also be available at Sydney Group Meetings. Sydney Group have already raised over \$100 by raffles and donations. However, as this is not sufficient other members might like to add a small donation to their subscription.

We are a Study Group of the Society for Growing Australian Plants and our activities are restricted to the study of NATIVE ferns only. Of course this does not mean that our members cannot grow other ferns (I have some myself), but it does mean that we endeavour to find out more about our own ferns, where and how they grow best, what conditions suit them best; in fact, everything we can find out about them. We are then in a position to disperse this knowledge amongst our members.

We would particularly like you to write about ferns of your own area, excursions to fern areas and nurseries and how you grow particular ferns, especially difficult or unusual ones.

In this respect, Anton Schmid of Mount Isa writes that he is growing *Platyzoma microphyllum* and I would like to hear more about that. This is a beautiful little fern that grows naturally in the northern part of Australia. I saw it first a couple of years ago growing at Kununurra (The Ord River town in Northern W.A. not far from the Northern Territory border). It was growing in a dry, burnt out rocky area and I found it hard to believe it was a fern. The rhizome is covered with golden hairs, the fronds erect, very narrow and the pinnae rounded and very close together giving it a braided appearance - hence its common name, Braided Fern. Is anybody else growing this fern?

LIST OF NURSERIES WHERE RELIABLE FERNS can be purchased - As native ferns are sometimes hard to get it has been suggested we publish a list. Whilst we wish to encourage members to grow their own, we'd like to hear from you of nurseries you'd recommend.

MR. CLIFF RITCHIE, 210 Persse Road, Runcorn, Brisbane. 4113...
Phone 341 5809 - is interested in forming a Group in Brisbane. He also invites members passing through to visit his fern house.
Thank you Mr. Ritchie.

THANK YOU JEANETTE CUNNINGHAM for your suggestion for an article on ferns easily grown from spores. Perhaps the spore bank will make up a set for beginners? We'll certainly consider such an article for our next newsletter.

MRS. H.R. BOSWORTH, P.O. Box 23, Victoria Estate, INGHAM. 4850,
would be interested to meet any fellow members passing her way.

I've had another excellent report from PAT HARRIS of Mosman (NS.W.) on growing ferns from spores. We published her previous report in Newsletter No. 5. She is still experimenting with mediums and having reasonable success. Sydney based members were privileged to have a meeting at her house and were able to see the results of her efforts.

SOME INTERESTING COMMENTS FROM A W.A. MEMBER:

Adiantum aethiopicum - could it require lime? "A relative trying to garden on a limestone rock planted hers in small holes in the rock which she filled with leaf mould. It grew so well she was afraid snakes would hide in it. As often as I transplanted it to my garden where acid loving plants grew, it died. Now I sprinkled a little freshly ground limestone on *Adiantums* and wish I had more room!

I am experimenting with mixtures for spore growing. One which was quite successful for Blechnums and Pteris was 'Compeat' and vermiculite. I don't sterilize and so it in margarine boxes which have been washed in very hot water and detergent and I have no fungus, moss or weeds. For drainage I sometimes use broken up styrofoam ... and the six margarine boxes fit neatly into a wallpaper water tray and I cover them with a glass louvre."

ASPLENIUM AUSTRALASICUM - In view of this ferns name change and the remarks published in Newsletter No. 4, RAY BEST though members might be interested in comments published about it and A. nidus over a hundred years ago in "Select Ferns and Lycopods", B.S. Williams, 1873. The genus was then known as -

THAMNOPTERIS (Presl.) - this genus consists of a few species producing entire fronds, remarkable from the peculiar manner of their growth. The fronds rise up from the crown leaving quite a hollow centre, from which habit they have been called Birs's Nest Ferns. They are very long lived and make splendid objects for vases, to stand on each side of a doorway in a fernery-and indeed Thamnopteris australasica will answer well for this purpose out of doors in summer time if not exposed to full sun. These plants will require but little soil as they make a mass of aerial fibrous roots on the surface from which if the atmosphere is in proper condition, they derive much nourishment. Rough fibrous peat, sphagnum moss and lumps of sandstone suit them best.

THAMNOPTERIS AUSTRALASICA (Presl). Fam: Aspleniaceae - Fronds which are simple and elliptic-lanceolate in shape and bright shining green, grow all around the rhizome so as to leave the crown elevated and exposed and thus form a hollow centre - their length is about four feet and their breadth from three to six inches; the midrib below is sharply carinate (with a keel) a character to be found in the species from its youngest stage. As it succeeds well in a cool house it becomes an invaluable plant where contrast and noble outline is studied. Native of New South Wales.

THAMNOPTERIS NIDUS - This is popularly known as the Eagle's Nest Fern, and is often confounded with the previous species; it is indeed similar in habit, and grows about the same size, the chief difference being that in the present plant the fronds are almost of equal breadth to the base, with the midrib obtuse, and that they grow out horizontally at first before taking up their upright course, thus leaving a much broader centre; it also requires the heat of a stove. Native of the East Indian Islands."

IDENTIFICATION OF FERNS: Some members say they are having trouble indentifying their ferns. I suggest you try your State Herbarium if in other states. If nobody can help you send a specimen to us and, if we cannot do it ourselves, we will have it done for you. The specimen is best pressed and we would require a frond with stipe and part of the rhizome. Also a small piece with spores if possible and a general description of its habit of growth, also where obtained if known. We suggest you number your specimens if sending in more than one and that you keep a second numbered one for yourself so that it does not have to be returned. Actually, using whatever books you have and trying to do it yourself is one of the best ways to learn.

We try to give pointers on identification in our newsletters, but there is really no simple way. Try to recognize your spore patterns, whether round or elongated, growing on the edge of the frond, etc. use a 10x hand lens and look at the spores every opportunity you have. As ferns are classified mainly by their spores you will be half way there once you can recognize these.

THE GENUS GLEICHENIA AND ITS RELATIVES by STEVE CLEMESHA.

1. GLEICHENIA - These ferns are well known and as a genus are very common. They grow from a long creeping rhizome. The fronds branch dichotomously and in the centre of each pair of pinnae is a bud and from this another part of the frond may grow. They grow intermittently and are capable of indefinite growth. They branch on up to four and five times and often are a dominant feature of the area where they grow.

They can form thick tangles that are hard to penetrate. Old fronds are persistent and give the plants an untidy look.

The plants favour more light than most ferns and they grow back rapidly after bushfires. One thing they cannot stand, either in cultivation or in the wild, is drying out and if ever they dry out to a point where the fronds show signs of wilting they will not recover. As a result all their habitats are ones which never dry out i.e. swamps, damp rock faces and crevices and cliff faces.

Big plants are hard to transplant but small ones will move and plants are easy to raise from spores. If potted in a peaty mixture the pot can be stood in water which needs to be changed from time to time to keep it fresh. The common species are:

G. dicarpa - This has green to yellowish fronds which are pinnatifid with numerous fine pinnules; the margins of these are inrolled and form a pouch on the underside. This occurs from Victoria to Queensland, and also Tasmania. It also extends to South East Asia, to New Zealand and New Caledonia. It is easily recognized by the pouched underside of the pinnules. This probably is the most plentiful species of the genus.

G. microphylla - This species is closely related to and resembles G. dicarpa but its leaves are a more attractive shade of green and they are flat and have no pouch on the underside which is plentiful in the Blue Mountains. It is found in all Australian States and also in New Zealand and New Caledonia, Malaysia and S.E. Asia. It is a more attractive species than G. dicarpa.

G. rupestris - differs from the above species in that the pinnules are larger and they are bluish green (glaucous) below. The rhachis are smooth and have very few or no scales nor hairs. It grows on rock faces and cliffs - sometimes facing the sea. One colony that grows on a cliff in the Coffs Harbour district is much larger than forms I have seen near Sydney and the leaves are thicker in texture. This species is found in South Queensland, New South Wales and New Caledonia.

The three species described above are plentiful and widespread. The following two are restricted in habitat and I have not seen them:

G. alpina - resembles G. dicarpa but is more dwarf and compact in habit and at times of the year it takes on a reddish or bronze colouration. The pinnules are pouched as in dicarpa but it has abundant fringed scales on the rhachis. It is found in subalpine meadows of Tasmania and New Zealand and is often abundant.

G. abscida - This also is a Tasmanian subalpine fern which is related to G. dicarpa and like it the pinnules are pouched on the underside. Each frond divides once only into a single pair of pinnae and there is no bud in the fork... The pinnae are most attractive being a deep emerald green above and dull green or even glaucous below. It was originally found growing with G. dicarpa (or alpina) south of Arthur's Range and was not seen again for a number of years. Recently it has been found in two other locations in the same general area. It would be most interesting to know how these two species grow in cultivation and what reaction they make to a warmer climate. Perhaps some of our Tasmanian members may be able to answer this question.

Two genera are closely related to Gleichenia. They are Dicranopteris and Sticherus. Both have much longer pinnules than Gleichenia and their fronds are often umbrella like in shape. They produce buds in the frond axils and can grow on indefinitely like Gleichenia. These genera are just as intolerant of drying out as Gleichenia.

Dicranopteris linearis - grows in sunny wet places and in the southern part of its range it grows in sandstone country, especially in roadside cuttings and crevices. It favours sunny places and its frond are quite umbrella like. It produces a pair of small accessory pinnae below each branching of the rhachis. The fronds are green above and glaucous below. The rhizome is clothed with hairs and not scales - which are found in *Sticherus* and *Gleichenia*. It can be cultivated in the same way as *Gleichenia*.

There are three species of *Sticherus* in Australia. They prefer more shade than *Gleichenia* and *Dicranopteris*. Their fronds are in the form of umbrella like pinnae. They form up to six tiers of these and may be straggling or upright.

Sticherus flabellatus - has pinnules at 45 degrees to the rhachis. The fronds are shiny above and glabrous below. The pinnules margins are slightly serrated. It occurs from north Queensland to eastern Victoria and also in New Guinea, New Caledonia and New Zealand. It forms colonies which can be quite large. It is found in gullies and damp soaks - places that never dry out.

S. tener - is similar in appearance to *S. flabellatus* but the frond margins are entire and there are silky hairs on the under side of the frond. It occurs in S.W., Victoria and Tasmania.

S. lobatus - has less umbrella like fronds than the other species. Its pinnules are at right angles to the rhachis and there are lobed pinnules at the pinnae junctions. Its fronds are dull green above and lighter green below or glaucous. It occurs from south Queensland to Victoria.

The three species of *Sticherus* can be cultivated provided they do not dry out. Small plants are best as large ones resent disturbance.

BURRENDONG ARBORETUM: Have a project under way to establish a fern area and it has been proposed that our Group support such a project by providing ferns. I visited the Arboretum when passing through Wellington last year and was shown the area that was being considered for development for this purpose. Peter Althofer was away at that time and I was unable to discuss it with him. However, I would ask all members who can to grow a fern or two for them.. By the next newsletter we should have more information and will possibly be able to organize a delivery from Sydney. They have an excellent shade house so should be able to hold any ferns received....

FERN COURSE AT MEADOWBANK TECH: This was most successful and those members who were able to attend felt they had learnt quite a lot. There is a possibility that it can be repeated towards the end of the year, but rather remote at present. We will let you know as information on this becomes available. Meanwhile some notes taken from David Sonter's lectures on propagation and cultivation may be of interest to members. He spoke of average conditions that apply to most ferns - there are exceptions.

Light requirement- Outdoors - under shade cloth 75%
in garden - shaded from sun
Indoors - filtered natural light - not on window sill where sun shines.

If there is not enough light fronds become elongated and very spindly. Rhachis become elongated between pinnules. Ferns tend to yellow. Ferns yellowing (outdoors) could be getting too much sunlight provided they have sufficient fertilizer. Try fertilizing and if they don't respond then there is too much sunlight. Ferns can't be changed from low light to high quickly - if moving them make the change gradually, protecting them with a cover if necessary. Temperature - 25 degrees C. is ideal for most ferns.

SOME GOOD OUTDOOR FERNS ARE: *Asplenium bulbiferum*, *Blechnum cartilagenium*, *Polystichum australiense* and *P. proliferum*,

Sticherus sp., Pteris tremula, P. umbrosa, Doodia aspera, D. media and D. caudata, Pelaea falcata, Davalia pixidata, Adiantum aethiopicum, and A. formosum (likes lots of shade) Lygodium japonicum is a fern that does not grow well outside - but does extremely well indoors. It gets a fungus if it gets cold.

Watering: Ferns generally don't like water on foliage all the time - but keep soil moist. If using overhead watering have plenty of ventilation. Ferns, as Sydney people noticed in the recent very hot weather we had, are very susceptible to dry, windy days. Rate of uptake of water is not as fast as that of angiosperms. Propact if possible, otherwise spray. Indoors pots should always be damp. Outdoors the ground sometimes appears to be dry but probably they have their roots well down in moisture. In cases of areas with seepage problems plant on the edge or mould soil over.

A good basic soil mixture was given as 40% Peat, 60% sandy loam with humus, plus 3 healthy pinches of Lime (for a 5" pot) and Osmocote (9 month). The lime is to counter action of peat. Adiantums thrive at a pH of 7 (See experience of our W.A. contributor). Actually earlier on in the lecture David recommended a pH of 6.5 for Maidenhairs and 5.5 for other ferns.

Repotting: If plant is drying out every day it needs a bigger container or heavier mix. (Sonters ferns need watering every day - or repotting).

Fertilizing - (Indoors)... if yellowing suggest Aquasol at $\frac{1}{2}$ strength to test for nitrogen deficiency and if it doesn't green up in 4 days needs something else. Other fertilizers suggested Fish Emulsion... plant pills... Always start at half recommended strength... once a week during growing period.

Indications of Cold - All tips will yellow. Notice ferns when first weather turns cold - tips yellow - ferns become crinkly. Fertilizer burn is random.. If all tips, possible fern is in a draught.

General Care of Ferns:

Good management is the easiest and best way of looking after plants. Watch for insects and pick off each morning. For Scale, Mite, Aphis Mealybug - if possible submerge in a bucket of soapy water. Dipel recommended for caterpillars. If necessary to use insecticides, etc., use at low strength. Use Baysol for slugs and snails. If green algae forms on top of soil - soil in pot is too acid or not well enough drained.

Returning from a recent trip north I called at Bangalow to see Margaret Wright's fern collection. This was quite impressive and Margaret would welcome members if they would phone or write before they call... She runs, with her husband, a very busy wholesale nursery so does not have much spare time - prefers week-ends. Her address is 11 Rifle Range Road, Bangalow. (P.O. Box 37). She has had considerable success growing ferns from spore and always sterilizes her spores. Using boiled water add 5% by volume household bleach.. immerse for 5 to 10 seconds... Rinse two to four times with sterile water. Sow from the water solution or dry and store until needed. Barbara Joe Hoshizake in her "Fern Growers Manual" (P.65) gives similar instructions - also instructions for sterilization of spores still within the sporangia.

NEWSLETTER NO. 7

MARCH, 1979.

COLLECTING SPORES: (Further to query - When are spores ripe?)

Most spores are located in clusters on the back of mature fronds. They can be from one-sixteenth to an eighth of an inch wide and may

be round, oblong or linear. Occasionally sporangia are scattered over the entire undersurface of the frond or born on modified portions of the leaf. Some ferns produce spores all year while others are seasonal. Check first with a 10x lens to make sure that the spores are ripe. When the sporangia (spore cases) begin to ripen most will turn from green to light brown, and then to a medium or dark shiny brown (in some, mature sporangia are yellow or orange - even green). Dull, frayed-looking sporangia have already shed their spores. Pick the fronds just as most of the sporangia are turning light to medium brown. If indusia (the covering over the sporangia) are present they will be intact, will look firm, and will usually - depending on the species - be light brown, gold or nearly black. Green indusia indicate the spores are not ripe. Shed or shrivelled indusia indicate that the sporangia may have shed their spores. Plump sporangia without a cracked wall still have their spores, whereas frayed ones or ones with cracks or slits have shed their spores. Collecting spores on a cool dull day reduces loss of spores or contamination.

EXOTIC FERNS WHICH HAVE BECOME NATURALISED IN AUSTRALIA

- by Steve Clemesha

A number of ferns native to overseas countries have become naturalized in Australia. Some have spread to areas remote from civilization and are easily mistaken for native species. In addition to this some native species have become established in areas outside their natural habitats.

PITYROGRAMMA CHRYSOPHYLLA (L) Link - The Gold Dust Fern is a plant which grows in tufts and it has the general habit of a Polystichum. The new uncoiling frond and the backs of the new fronds are covered in fine waxy powder. These are sometimes mistaken for the spores which are brown. It is a native to South America and is now widespread in Queensland. A number of years ago it was reported from the Gibraltar Range. It is now common in a number of areas of the North Coast and grows in at least four locations in the Coffs Harbour district. Favourite habitats are on road banks and in full sun and often in fairly dry positions. It is plentiful in the Lismore - Ballina area and seems very much at home on the red soil road banks in the area. Its clumps have a characteristic appearance and I know of locations where plants can be seen easily while driving along the Pacific Highway. Two of these locations are near Ballina and the third is near Tweed Heads.

PITYROGRAMMA CALOMELANOS (L) Link - Also is a south American native and it is a weed in many tropical countries. It is very similar to P. chrysophylla but where that species has gold powder this one has silver. It also is very hardy and grows in full sun in open positions. Though well established in North Queensland it does not appear to have established itself in the south.

SELAGINELLA KRAUSSIANA (KUNZE) A.Br - Creeping Club Moss is commonly cultivated in shady positions in gardens and fern houses. Some people regard it as a nuisance. It is a native of Africa and has become established in some cool moist areas of Victoria. I also have seen it in Sydney but possibly from plants that were dumped there.

SALVINIA AURICULATA Aublet - This is a free floating aquatic and is regarded as a threat to tropical water ways, as is the water hyacinth. It spreads rapidly in warm climates and has been recorded from Queensland and Northern New South Wales (widespread) and Western Australia where it is reported to have been eradicated. Often it is cultivated in goldfish ponds. It is a native of Central and South America and it should not be cultivated in tropical and subtropical climates because of the danger of it spreading.

BLECHNUM OCCIDENTALE L - From South America is reported to have become naturalised on the banks of the Daintree River in North Queensland. It is very similar in appearance B. vulcanicum from

Tasmania and New Zealand and it has been mistaken for this species.

NATIVE SPECIES:

PTERIS VITTATA L - is widespread through tropical and temperate areas of Asia but in Australia it is comparatively rare and seems to prefer limestone areas and rocky gorges. It has become naturalized in sandstone walls and crevices of a Sydney suburb - Castlecrag. It also appeared on disturbed ground near Coffs Harbour, N.S.W.

PTERIS TREMULA R. Br. Is a native of all Australian States except Western Australia. It also occurs in Central Australia, New Zealand, Norfolk Island and Fiji. It is a very weedy species and comes up readily in gardens and at the base of moist walls. It is a common colonizing plant in some harbourside and bayside suburbs of Sydney and Melbourne. Individual plants are fast growing and are sometimes mistaken for young tree ferns. They are short lived and persist only for a few years. The spores are very easily raised and it is a common "Ring in".

CYATHEA COOPERI (Hock. ex F.Muell.) Domin - A number of tree fern species are colonizers being among the first plants to come up in disturbed areas in suitable habitats. Cyathea australis and Cyathea leichhardtiana come up along disused roads in rain forest in the Coffs Harbour area. C. robertsiana does a similar thing in north Queensland. Around Sydney in the hilly sandstone suburbs Cyathea cooperi commonly appears along gutters, in disturbed bushland near houses and on moist brick walls. It is rare in undisturbed bushland of the area. A colony has also become established along creek banks in the Bedfordale area of Western Australia. It, originally, was reported as Cyathea australis.

COLLECTION OF SPORES.

Materials required: Squirrel or sable/brush (most suitable), /hair a good magnifying lens, some sheets of smooth white cardboard and a small container. As most spores occur on the back of mature fronds, this is where we must look, before removing leaf make sure (with magnifying lens) that the spores are ripe. Then remove the frond, bend one sheet of cardboard in half, place sample spore side down on sheet. Attach with scotch tape if you wish, bend flap over, leaving air gap, place in a warm but not hot position inside the house free from wind or draught. Leave for a day or two when you will find beneath the frond the exploded spores. Remove the leaf and carefully with the hair brush move the spores to the centre groove. You can assist this by gently tapping the back. Prepare receptacle and tip cardboard up. Tap until spores fall into the container. Often you will obtain both spores and exploded springs. As long as spores also are present this does not matter. Some spores are almost colourless and difficult to see. When brushed together they become visible. Note that not all but most of the Blechnum species produce spores on centre young fronds that grow solely for the purpose and take a different form to the ordinary frond. Todea barbara also produces spore on the young centre fronds. These spores throw very quickly and are green. Once cast they leave brown receptacles like egg shells. It is an advantage to plant spores while they are fresh.

A NOTE ON BRACKEN - One of the best known plants in the world is Bracken fern. It is one variable species or about six closely related species which are not always clearcut. The present accepted general Australian name for the most widespread form is Pteridium esculentum. Two others are found in north Queensland. The name 'esculentum' means edible. This is not really true as it contains poisonous properties. Young spring fronds are collected, dried and eaten in Japan, but that country has the worlds highest incidence of stomach complaints and it is thought this may be due to eating bracken.

In New Zealand the Maoris dug up and roasted rhizomes but only those in certain favoured areas where the rhizomes were less tough and fibrous than they usually are. Though famous and well known it is often confused with other ferns. It can be distinguished from them by its harsh feel and the sori which are marginal and protected by an overturned leaf margin. They are inconspicuous and easy to overlook. Brackens are found in a wide variety of well drained soils and they respond well to fires and are a pest in pastures. Control is difficult but repeated slashing and other agricultural practices will reduce it significantly. I have never attempted to raise bracken from spore and would be interested to know how easy or otherwise it is. I have noticed it does not seem to come up as a ring-in in pots of spores. It leaves this to its close relative Histiopteris incisa and some species of Pteris and also of course other ferns less closely related to it. The curious paradox about this fern is that it is very difficult to cultivate and is one of the most difficult ferns to transplant.

RAISING FERNS FROM SPORES: A frequent request received is how to raise ferns from spores. A number of variations of the same basic way exist. Ray Best described his method in Newsletter No.1, which many of the new members will not have, so below I will describe the method I use:

1. Container - A terracotta pot as this can be placed in the oven to be sterilized. If plastic is used the soil must be sterilized separately.
2. Soil - I prefer to fill most of the pot with peatmoss and top it with Sphagnum moss. If peat is unavailable garden soil or sand will do.
3. Sterilizing Soil - This is most important and without it I have no success. It can be done by putting the pot (if terracotta) in the oven at 250 degrees F. to 300 degrees F for about half an hour. The temperature is not critical - higher does no harm. If plastic pots are used the soil must be sterilized separately. With terracotta the pot complete with soil and sphagnum can be done.
4. Wetting - On removal from the oven after cooling the growing medium surface may be dry. If so, wet it with boiling water. Cold water will contain algae spores and undo the work the sterilizing has done.
5. Sowing - Scatter spores rather thinly and evenly over the cooled damp surface then cover the pot with a piece of clear plastic and tie this on with string or cut nylon stocking. Stand the pot in a saucer of water in a place that receives no direct sun but plenty of light. The more light the faster the growth will be.

BLACKING OUT - Some growers report that the pot should be blacked out with a sheet of black plastic for two or three weeks. I have found it to be no value whatsoever.

RING-INS: Despite all precautions you take and even if you never open the cover, ring-ins may occur. If germination of planted spores is good they will be few and obvious or nil; but if germination is sparse - say 20 prothalli or less - suspect them. Probably they are on the fronds when the spores are collected.

FUNGUS INFECTIONS: If these occur they will spread gradually across the prothalli killing off the prothalli as they go. Benlate used at recommended strength will stop it. It is harmless to prothalli but use it VERY carefully as it has recently been found to be dangerous to man.

At a recent committee meeting the question arose as to just what was a "Saprophytic Spore" - so for our information Steve Clemesha and Ray Best provide the following -

SAPROPHYTIC PLANTS AND FERNS: Most plants produce chlorophyll from

the time the seed or spore germinates and it continues throughout their lives. Some plants however are saprophytes. These are plants that feed by absorbing organic food from dead and decaying material. They contain no chlorophyll and do not carry out photosynthesis. When their food supply is exhausted they die of starvation as they have no other means of feeding themselves.

Most fungi are saprophytes (the exceptions are parasites). Common examples are toadstools, mushrooms, the dry rot fungus that destroys wood and the mould which grows on bread. They are valuable as they convert dead organic material to humus which becomes a part of the soil.

Some more primitive ferns have prothalli which are said to be saprophytic e.g. Ophioglossum, Botrychium, Schizaea, Marattia, Angiopteris and probably Helminthostachys. In case of these the prothallus is devoid of chlorophyll and often fleshy. It is not a simple saprophyte like fungi but it lives in an extremely delicate relationship with a fungus that obtains its food for it and feeds the developing prothallus. The relationship is very delicate and so far has not been successfully copied in cultivation.

Quite a number of orchid species are saprophytic and live in a similar relationship to that mentioned above. Again the relationship is a very fragile one. People sometimes attempt to cultivate saprophytic orchids but in all cases the result is the same...after transplanting all root growth stops because of the delicate relationship with the fungus being lost and the plant lives on its stored food until it dies. It may even flower before this if it is a species with a large root system. Some orchids are complete saprophytes with no green parts at all. They are underground plants which only appear above ground as a leafless flower stem. Some even flower underground and only the seed capsule grows above ground level. Other saprophytic orchids have a few to a lot of green part but not enough to sustain them.

All orchid seedlings on germination are invaded by a fungus for the first stage of their life and are dependent on it to begin growth as it supplies sugar. It is easy to understand these lapse into becoming saprophytes all their lives. The roots of most (if not all) non saprophytic orchids contain a fungus (probably the one required for the seed to germinate) and it presumably has some beneficial effect on the plant.

It is probable that some species of the fern genus Schizaea are at least partial saprophytes but others, especially S. rupestris are not. This would not be surprising as some orchid genera have a few (or numerous) saprophytic species e.g. Cymbidium, Dipodium, Eulophia, Prasaphyllum, and Cryptostylis while other genera are wholly completely saprophytic, e.g. Gastrodia and Neottia.

NEWSLETTER NO. 5

MARCH, 1978.

PLATYCERIUM SUPERBUM - In recent years the widely cultivated Staghorn Fern - long known as Platycerium grande - had its name changed to P. superbum. The reason is that P. grande was described from a plant collected in the Phillipine Islands and it was thought that our Australian plants were the same. Recently it has been found that Australian plants are different so the species name "superbum" replaces "grande" with Australia. P. grande is the correct name for the Phillipine species.

P. superbum has been cultivated for many years. It is found in north Queensland where it is much less plentiful than in northern N.S.W. and southern Queensland. It extends from south Queensland through northern N.S.W. south to about the Hunter River. It grows mainly in rain forests and does not appear to grow at as high elevations as P. bifurcatum. Over all it is much less common and more specialized in its habitat than P. bifurcatum, though even today can be locally plentiful. The cultivated plants, almost without exception, have been wild collected. Today they often fetch high prices and I have seen them for sale from \$30 to \$40 each in Sydney. This is a bad sit-

uation as commercial collectors will go to any lengths to collect plants that fetch that sort of price.

The obvious solution is to raise them from spores. These are easily collected and raised to the prothallus stage in the usual way but they become more difficult when it is time to plant them out as they rot off easily round the size of a 20¢ piece and they dry out and die quickly if mounted too small. Most people lose them at this stage. The best way to overcome this problem is to pot the young plants. Put them in a peaty mixture and put them on a elevated mound in the middle. Water when needed and they will not rot off or dry out provided MODERATE watering is continued. When established this will be no more often than normal bush house plants. It is most important to keep the pots out of the rain and they must be under a cover or will rot off for sure if they are exposed to wet weather. In southern areas winter waterings will be needed only occasionally and the plants should be kept on the dry side. To avoid problems it is best to plant them out in the spring as they will be established by winter. Grown in this way the plants can be kept in pots until large enough to mount. If you still get rot off or drying out check to see they are not getting too much wind or are being kept too wet.

One of our members, Mrs. Pat Harris of Mosman, N.S.W., has been doing some interesting experiments with growing ferns from spores and a summary follows. What is expecially good is the way she has recorded her efforts and made them available for other members. Thank you Pat for your efforts.

Spores were obtained from Ray Best and experiments carried out with bush sand, peatmoss and spaghnum moss as growing mediums but the sand was most successful. Pat Sterilizes it in the oven, together with terracotta pots, crocks, and washes plastic pots very well with hot water and detergent. She uses hot tap water (cooled) to water for the first month but her bush house is fairly open and she doesn't continue with this. So far she has had no problems with algae or fungus but gets the usual ring-ins. Her garden is becoming increasingly shaded by trees and this, with its aspect and wet summers made her decide to concentrate on ferns. As soon as the sporelings are big enough they are planted out. Losses so far are mainly due to cats and dogs. Her other main losses are in transferring very small plants from the first pot to the next.

(AS THIS IS A PRETTY COMMON PROBLEM COULD WE HAVE COMMENTS FOR THE NEXT NEWSLETTER ON HOW MEMBERS OVERCOME THIS).

Whilst she was away for 2 months last year, although minimum care could be given to the ferns, only very few were lost. Rumohra adiantiformis, Cyclosorus truncatus, Cyathea cooperi, Blechnum cartilagineum, Polystuchum proliferum were all transferred to old fish tanks and covered with glass terrarium style. They did very well under these conditions, kept indoors, and receiving no attention whatsoever. The others were also kept indoors being topped up with water in the containers in which they sat. Some dried out from insufficient water but most were o.k. :

FERN	SPORE SOWN	FIRST SIGNS	POTTED ON	PLANTED OUT
Cyclosorus truncatus	15.11.75 (now growing very well in shaded parts of garden.)	7.12.75	3.3.76	Dec. 76
Blechnum cartilagineum	22.2.76 (all growing well, even in drier parts of the garden)	6.3.76	Oct. 76	by Feb.77 most planted out
Rumohra adiantiformis	19.11.75 (some doing very well in baskets others probably dried out.)	10.12.75	May. 76	Dec. 76 (some planted hanging baskets)
Cyathea cooperi	22.2.76 (100's of plants)	6.3.76	Jan. 77	Some planted out June 77.
Cyathea australis	22.2.76	July, 76	By Feb.77	all potted on, but not very successful. Only a few left.

Continued,

FERN	SPORES SOWN	FIRST SIGNS	POTTED ON	PLANTED OUT
Cyathea robertsiana	15.11.75 but by April 77	8.2.76 only one (1)	by Feb.77	all potted on, and could be ring-in.
Cyathea rebecca	not successful			
Polystichum proliferum	22.2.76	13.3.76	April 77	
Blechnum nudum	9.11.76	30.11.76		
Lastreopsis acuminata	9.11.76	19.12.76		
Todea barbara	30.10.76	19.12.76	Spores collected	23.10.76 as previous attempt spores too old.
Pellaea falcata	9.11.76	19.12.76		

MEMBERS: Will you please write about ferns of your own areas - how you are growing particular ferns - especially difficult or unusual ones.

MINNAMURRA FALLS: Our trip to Minnamurra Falls on Sunday 27th February, 1977. -(apologies for belated reporting) was after a period of extremely heavy rain. This had caused tremendous damage to bridges and pathways and for this reason we were prevented from climbing to the upper part of the falls. However, the area we were able to see was most impressive and the effect of the flooding with great boulders and trees, together with parts of the damaged bridges, washed down the River was quite dramatic.

Mr. Judd, the now retired Ranger who has given so much of his life to this beautiful area, met us and came a little way on our walk. He had been flood bound for four days previously.

Near the entrance and picnic area there is a display board of Ferns collected in the area. This was originally prepared and cared for by Mr. Judd. Rather sadly he can no longer look after it. A copy of this list is included for those who may be interested. The ferns marked + are those we actually saw. Of course it is possible that we missed some.

The general area itself is most interesting and the type of rain-forest vegetation generally expected to be seen further north. A point of interest was some natural regeneration taking place in a section of land, comparatively recently acquired, where rainforest is taking over from lantana. Weed problems are bad in the lower areas near paths and we heard some comment that the park is suffering from overusage in recent years. It is a beautiful and interesting place well worth a visit. The list of ferns follows - space does not permit use of common names:

+ Adiantum aethiopicum	Grammitis billardieri
+ " diaphanum	Histiopteris incisa
+ " formosum	Hymenophyllum australe
+ " hispidulum	" bivalve
+ Arthropteris beckleri	" cupressiforme
+ " tenella	" flabellatum
+ Asplenium australasicum	" marginatum
+ " bulbiferum	" rarum
+ " falcatum	Hypolepis muelleri
+ Athyrium australe	" punctata
" japonicum	+Lastreopsis acuminata
+ Asplenium flabellifolium	" decomposita
+ " flaccidum	+ " microsora
Blechnum chambersii	Ophioglossum lusitanicum ssp.
" ambiguum	+Pellaea falcata coriaceum
+ " cartilagineum	" paradoxa
" gregsonii	+Platyterium bifurcatum
" minus	Polyphlebium venosum
+ " nudum	+Polystichum australiense

The family which I claim have an affinity to ferns because of their ancestry, comprises woody palm-like trees of various heights up to about 3.5 metres. Exceptions are the Australian Lepidozamia hopei, 30 metres; Encephalartos laurentianus, 11 metres and Dioon spinulosum, 17 metres.

Cycads are dioceous (that is producing separate male and female plants) and very slow in growth if grown from seed... Len P. Butt.

NEWSLETTER NO. 3

ANGIOPTERIS ERECTA. The King Fern (of North Queensland). This is the largest of our ferns. It does not form a trunk like a tree fern, but its crown of fronds is, in a good specimen, larger than that of a large tree fern. Impressive specimens grow beside some highways linking the North Queensland coast with the highlands. This fern once extended to the Tweed River in N.S.W. but now appears to be extinct in N.S.W. (There is one growing in the Sydney Botanic Gardens). I have not seen any plants in Southern Queensland, so if still present it is rare there. A small population of them grow in a sheltered side gorge in the Carnarvon Gorge of Central Queensland. This interesting area contains another interesting fern - Platycterium vietchii - a fern which for many years was thought to be confined to this area. The main habitat of Angiopteris is in the rain forests of North Queensland. Here feral pigs have destroyed some plants so that the species has suffered by man destroying the rainforests where it grows and by introducing destructive animals. The plant has thick, fleshy roots not unlike those of Monstera deliciosa. The crown of the plant is large and starchy inside. The base of the frond is partly enclosed by a fleshy structure called an auricle. The stipes are smooth and the fronds dark shiny green. The individual leaflets are more or less lance shaped, though some have edges which appear lacerated. The spores are carried in minute clusters of small boat like structures. This distinguishes it from its near relative, Marattia salicina, which has longer spore cases which are single and not in groups. Angiopteris and Marattia are primitive ferns. Their prothali live in a delicate association with soil fungi and are impossible, as far as is known, to raise in cultivation. Therefore we have to rely on vegetative propagation. If the structure which encloses the frond base is cut off with the stipe base still enclosed it will eventually produce a small plant. The frond base will rot out in a few weeks but the structure that encloses it will not unless kept too wet. This is particularly important in the early stages. Under Sydney conditions it takes about a year, but should be faster in more tropical places. Angiopteris can be cultivated outdoors as far south as Melbourne in sheltered situations that are not subject to frost.

FERNS THAT CAN BECOME PESTS:

Whether or not a fern will become a nuisance in the garden depends greatly on the situation. The greatest fern pest of the farming world is bracken. This is unlikely to become a pest in the fern garden or be a persistent "ring-in" in the spore pot. It is difficult to eradicate from areas of the garden that can't be dug or mown. Ferns that can become a pest are mainly those with long-creeping rhizomes, i.e.. Histiopteris incisa, Denstatia davallioides and species of the genus Hypolepis.

Pteridium esculentum (Bracken). The deep tough rhizomes of this fern make it a very difficult plant to eradicate, but it is more a weed of farmlands and sunny places than the garden. Its prothali are not a serious problem for appearing as ring-ins in pots of more desirable species.

Histiopteris incisa (Bat's wing fern). This species also has a fast spreading habit and it is likely to become a nuisance in wet situations (sunny or lightly shaded). It is a real nuisance as a "ring-in" in spore pots and areas where it grows nearby.

Denstaedia davallioides has fine lacy fronds and fast spreading rhizomes. It will quickly spread through shady and damp situations.

Hypolepis punctata, H. muelleri and H. rugosula, and no doubt other Hypolepis sp. spread very quickly but the rhizomes are slender and fairly easy to pull up.

In certain damp, sunny situations Sticherus flabellatus, other Sticherus sp., Gleichenia sp. and Dicranopteris linearis may become a nuisance, and if the area is rocky they are difficult to eradicate. Under different situations other ferns may prove troublesome. Reports on these would be welcome for future newsletters.

SOME FERN NAME CHANGES:

Pneumatopteris pennigera (Forst.) Holtt. Vic., Tas
syn. Cyclosorus pennigera Forst.

Lastreopsis acuminata (Houlston) Morton Q, NSW, Vic, Tas, SA.
syn. Lastreopsis shepherdii (Kze ex Mett.) Tindale

Asplenium australasicum (J. Sm.) Hook Q. NSW.
replaces Asplenium nidus L. (Bird's nest fern)

Lygodium microphylla (Cav.) R. Br. Q. NSW.
replaces Lygodium scandens (L) Sw.

Blechnum watsii Tindale Q, NSW, Vic, Tas, SA.
replaces Blechnum procerum (Forst.f.) Sw.

Christella dentata (Forst.) Bromsey et Jermy Q, NSW, Vic, SA. WA.
replaces Cyclosorus nymphalis (Frost, F.) Ching.

STEVE CLEMESHA.

NEWSLETTER NO. 2 OCTOBER 1975.

Problems of Raising Ferns from Spores.

When raising ferns from spores problems can occur and these lead to disappointment and frustration. An understanding of these helps to overcome them.

1. "Ring-ins". No matter how thoroughly the growing medium is sterilized and how brief a time the pot is left uncovered, spores of unwanted ferns can creep in. Whether this is because the air is rich with them or they come with the spores is not very clear, but it seems to be the former as it is usually local ferns that appear. The frustrating point about them is that you may get 20 to 30 ring-ins in one pot and the spores you wanted may fail.. When this happens it is some time before the error is realized. Ring-ins should be suspected in pots where germination is sparse. They seldom occur in nuisance proportions in pots where germination is thick. Ferns which (around Sydney at least) are likely to be ring-ins include Athyrium australe, A. japonicum, Cyclosorus nymphalis, Culcita dubia, Histiopteris incisa and Cyathea cooperi. Any fern growing near where you are raising spores is likely to cause ring-ins to appear.

2. Infertile Spores: Spores which are sown often prove to be infertile. Reasons can be: collected before maturity; collected after all spores have been shed and only sporangia remain (a common problem with Blechnum, Asplenium, and many Polypodiaceous ferns): spores which have lost their viability through being stored too long (the shelf life of spores varies from species to species and in many cases is very short): sowing spores of a sterile hybrid (rare among Australian natives). When infertile spores are sown a crop of "ring-ins" often follows and this causes one not to realise for some time that the desired ferns are not growing.

3. Fungi infection; Some fungi will appear on pots soon after spores have been sown and grow for a time then disappear. Others may cause the prothalli in a certain area to die and that area gradually spreads until the pot is wiped out. This can be stopped in two ways - (1) mix Benlate in proportions recommended by the manufacturer and water with this. It will stop the fungus quickly and causes no damage to prothalli or young sporophytes; (2) Remove prothalli from part of pot away from infection and reset - watch for further outbreaks. Benlate treatment is easier and more effective.

4. Algae: This develops faster than spores germinate and may prevent them from doing so. Sterilizing growing medium usually prevents them getting off to an early enough start to be a problem; if algae germinates after the spores it seldom causes any problem. Little can be done except to reduce the amount of light and transplant your plants.

5. Incorrect Light; Too little will greatly slow up growth, too much causes algae formation and direct sun causes burning.

6. Unsatisfactory Growing Medium: Some ferns will grow on sand; peatmoss is better but spagnum moss is better still. Prothalli on an unsatisfactory growing medium will either die or grow extremely slowly.

FERNS IN NATURE.....by Charles Taylor.

Where do ferns grow in nature? I have read the statement that ferns grow in rain forests living on the compost under the trees. After spending many hours bush walking I have noticed that ferns grow on the edge of forests where light is good, or along the banks of creeks where there is better light as no heavy trees grow there. They grow on logs, rocks, etc. Ferns that grow in the tops of trees are actually just above the heavy foliage. Those falling to the ground, where the light is bad, always die. From this we see that ferns need good light to thrive.

Ferns are very adaptable plants. To get a nice fresh green plant they need a plentiful supply of water, good light, but no direct sun. But some will grow in the hardest conditions, on rock faces, out of cracks in stone fences, sometimes in full sun, resulting generally in small, tough, "Bonsai" plants.

I have found it far easier and quicker to grow a good plant from a sporeling than from a piece taken from a large plant. When my ferns are about 1½" to 2" high I lift them out and plant singly in 3" pot. Fill pot with soil, make a hole in centre, plant sporeling, firm, water until the soil is almost mud and keep in this condition for a couple of weeks. After about 2 months when well established move into a larger pot. From September ferns are strong growers. It is in September/October that the new fronds appear. During these months if one were to knock a fern out the roots would be seen around the sides of the pot and for good growth, then is the time to move to a larger pot. A sporeling potted in August/September is moved to a larger sized pot 3 or 4 times to April. Winter is a dormant time for fern growth but they still need liberal watering.

The adventitious stem of a Hare's Foot fern needs something to grip on for best results. If this root is allowed to hang loose it stops making new fronds. In nature these ferns climb along branches or trunks of trees, thus having something to grip on all the time. To make a pot plant of one, place bits of bark or hardwood in pot and train fern along. These can overlap. Polypodiums, like the Maiden Hair, are mainly terrestrial and will grow well in pots provided the compost is very open.

Artificial fertilizing is not desirable for ferns. A little old cow manure on top of the pot may help but the main thing is, are they wet enough? If collecting bush grown ferns bring them home with the root only in a plastic bag. When potting up or placing in the garden keep wet for weeks. When growing ferns it is a case of experimenting with compost, situation, etc.

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