

S.G.A.P. - Fern Study Group - Newsletter

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CULTIVARS:

While showing an acquaintance through my fernery we discussed SHELLOLEPIS SUBAURICULATA and its close relative S. SUBAURICULATA CV. KNIGHTIAE, he asked the obvious question "how did the cultivar originate?", being unsure, I made enquiries and the answers indicate that such plants are genetic "SPORTS" which occur in nature and that their spore will reproduce the cultivar form. I asked Ray Best for some information and he kindly prepared the following article in the hope of creating a response from readers which would lead to more recent material on this subject.

FERN HYBRIDISATION: Ray Best.

Having made a few futile attempts to achieve hybrid ferns; I am in no position to be definite about how reliable results can be achieved. Not many hybrid ferns of Australian species seem to be recognised here; those that are, all seem to be naturally occurring types and have not been artificially produced. If any such are available I certainly have not heard about them.

"Australian Ferns and Fern Allies" Jones & Clemesha, gives a list of possible Australian fern cultivars as described originally by Frederick Manson Bailey. As no explanation is given regarding their creation, I assume they are naturally occurring cultivars; also the prefix "possible" is rather vague. To those members who have a copy of this work a couple of methods of fern hybridisation are described.

One method I tried was to choose the members of the Pteris family; as according to most fern literature, Pteris cretica is credited with a large number of so called cultivars. As a result I collected spores of the parent Pteris cretica along with a number of other Pteris species; these I mixed together and sowed in a sterilized material. At the prothallis stage I flooded the culture with warm water a number of times. When the sporelings developed to maturity and were potted on, I found that I had representatives of all the types sown and much to my surprise one different species. This I was sure was a new cultivar; however it proved to be a known type. Also at this time I read an article on apogamy in ferns; here for convenience I will quote from a previous article of mine published in the "Newsletter", referring to apogamy in ferns. Quote "Cyrtomium, Pteris, Cheilanthes, Pellaea, Asplenium and some others, 10% of all fern types reproduce by a process known as apogamy. In these cases the prothallus produces no functional egg cells in the archegonium, but does produce active sperm in the antheridium. This of course destroys the sexual cycle". Quite a Jolt! the point in question being that all the so called cultivars of Pteris cretica must be questioned. Possible they are all the result of gene mutation, and possibly all true types.

For many years American botanists considered hybridisation impossible, and would not accept Professor E.J. Lowe's experiments in this field in England in 1900. Later Irene Manton (Department of Botany University of Leeds England) synthesized several hybrids for the express purpose

of studying their chromosome pairing. Manton succeeded in developing hybrid species of the genera *Adiantum*, *Cyclororus*, *Dryopteris*, *Phyllitis*, *Pleurosorus*, *Polypodium*, and *Pteris*. Also J.D. Lovis had achieved hybrids by the following method.

The prothalli are all grown on a soil medium that has been sterilized by passing boiling water through it; the surface then being sprayed with Orthocide Captan Fungicide. Spore sowing is the same for both the male and female parents. Once the prothalli develop those of the female parent are transplanted to new media being spaced $\frac{1}{4}$ to $\frac{1}{2}$ inch apart. This reduces the chance of premature fertilization and allows more rapid and even growth. The prothalli of the male parent are allowed to remain in a crowded condition, as this seems to delay the onset of the archegonia.

When the prothalli are ready for fertilization a small portion of the prothalli are removed from the culture of the male parent, and placed in warm water (25 to 35 degrees C) in a petri dish. A source of light is provided either using a 40watt incandenscent lamp at a distance of 12 inches or the sun; and the mixture is allowed in the light for about 20 minutes.

A small sample of the water is then examined under the microscope to determine the activity of the spermatozoa. If they are sufficiently active one prothallis from the culture of the female parent is removed from the medium, rinsed clean and placed in the petri dish. It is left there for about two hours after which it is removed rinsed and placed on fresh soil. Hybrid sporophytes will not appear before 4 to 6 weeks, while any sporophyte appearing before 3 weeks will probably be the product of self fertilisation. (from J.D. Lovis 1968.)

The hybridization of ferns is still in its infancy when compared to the hybridization of other types of vascular plants. Were it not for the intuition of Professor E.J. Lowe it would be younger still. (from a brief of HISTORY of FERN HYBRIDIZATION by Daniel R. Rice.)

For those interested attempting work on hybrids the following works are mentioned.

- Hickok L.G. and E.J. KLIKOWSKI "Chromosome Behaviour in Hybrid Ferns" American Journal of Botany 62. 560-569 1975.
- Hoshizaki B.J. "A Staghorn Fern (*Platyserium*) Hybrid" American Fern Journal 65. 99-101 1976.
- Lovis J.D. "Fern Hybridists and Fern Hybridizing at the University of Leeds" British Fern Gazette 10. 13-20 1968.
- Manton Irene "Problems of Cytology and Evolution in the Pteridophyta" Cambridge 1950.

As my knowledge of fern hybridization obviously is very limited; I am sure some of our young student members covering Horticultural, Botanical, or Biological courses at University level, would understand modern techniques of hybridization and possibly have achieved effective results. Members I am sure would welcome details of methods used and the species involved if such could be provided.

In Western Australia we have a very keen and helpful member who, although being of a retiring nature and preferring not to be acknowledged in our Newsletter, is the source of the three (3) following items.

(1) UNDERGROUND FERNERIES IN NEW ZEALAND:

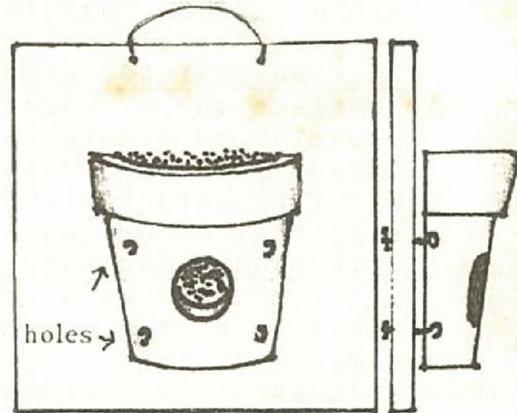
Over fifty years ago three fern houses were constructed below ground level in Pukekura Park, New Plymouth, N. Z. The design for this type of fernery came from a Mrs. Lovell who, noticing a number of ferns in a disused well on her property; had an area excavated, added a glass roof and successfully grew ferns, mainly *Adiantums* for use in her Florist business. When it was decided to construct a fernery in the

Park, Mrs. Lovell suggested one modelled on her original idea and in the late 1920's a hillside covered in gorse and blackberry was tunnelled into and three areas, (approximately 60' x 20') were excavated at varying levels. The clay removed was used as "FILL" for a nearby swamp, which now serves as a lawn with flower beds. In the Taranaki area they are fortunate in having this solid clay, said to be ash from nearby extinct Mr. Egmont when it erupted centuries ago, for it has no sand content and has therefore stood the test of time. Although the three houses began as ferneries, two, over the years have been changed; one to display a collection of orchids, mainly Cymbidiums in season and Begonias, Fuschias etc. in the summer. The second houses a collection of indoor plants elevated on a centre staging, surrounded by fern covered banks. The third house has been retained exclusively for native ferns. These three houses are linked by moss and fern covered tunnels to a fourth house built at a later date on the hill top. This unique set up has, over the years, been admired and photographed by visitors from all parts of the world. There are disadvantages in being below ground level, with little air movement, stagnant pockets develop and some ferns, more often exotic plants tend to damp off. The temperature can rise in summer and grow colder in winter, but by dampening the sawdust floors and hosing the fern-clad vertical banks it can be controlled in summer and winter heating is not required. Having shallow foundations, these glass roofed houses and astragals, built of oregon timber do not require a great deal of maintenance other than spraying the glass with white wash, to cut down on the amount of sunlight entering. Our Correspondent comments, "imagine the fun white ants would have if we tried to build a similar structure in W.A. My husband cut some pine slices to mount Staghorns, but the white ants were on them before the ferns!! I have also found that fungus grows on the pine rounds but not on rounds of Jarrah Wood."

(2) "GROWING ON" PLATYCERIUM SUPERBUM.

I first tried growing P. superbum from spore because I wanted a P. coronarium. When the first fronds appeared they looked like blades of grass and for a long time I could find nothing in books, or anyone who could tell me if they were "STAGS" or not. In time and after ascertaining that they were, my next problem arose when it became time to mount the young sporelings. Our humidity is low in summer and the small plants died when mounted directly onto boards, but if left in pots, became funnel shaped. A terracotta pot cut in half and mounted on a board was the answer. Small holes were drilled to secure it to the board and a hole about 2½" diam. drilled in the centre of the half pot through which the little fern was pushed (tightly against the pot) and the back filled with sphagnum. This was enclosed in a plastic bag containing holes which were enlarged as the plant hardened. Cutting terracotta pots with a masonry drill isn't easy so I began to use polystyrene coffee cups, cutting holes with scissors and pegging them to shelves.

My next problem was WHICH WAS TOP OR BOTTOM, one book said, "the curl of the fronds goes to the top," but mine didn't have curls! I put some up and some down and one I put sideways to see if it would right itself. For twelve months this one grew sideways but now its new frond is changing position, I think it will right itself (it's about 6" diam.) I suppose I was cruel but after noticing that a frond on another plant was growing longer at the top I turned the pot upside down and the next new frond also grew longer at the top. So this lopsided fern has given me my answer. By the way - I now have a tiny P. coronarium mounted on a terracotta pot and doing well. I shall pass it on to my great grandchildren along with the family china!



(3) BUYING FERNS IN THE WEST:

Westralians now live in a State pretty well endowed with ferns for sale, gone are the days when new ferns were hard to find here. Ferns from three wholesalers who use tissue culture methods are available through Chain Stores and numerous Ferneries are appearing in the suburbs. Some that I have visited are:- THE WILDFLOWER NURSERY ON WANNEROO RD. WANNEROO which specialises in natives, also has ferns from New Zealand and Bangkok here I bought ASPLENIUM LASERPITIIFOLIUM and BLECHNUM ARTICULATUM. MRS. CLARK'S FERNERY ON SPRING RD. ROLEYSTONE sells Queensland ferns such as PLATYCERIUM VEITCHII, P. HILLII and ANGIOPTERIS ERECTA. THE ELKHORN NURSERY 4 TEAQUE STREET VICTORIA PARK sell sizeable P. SUPERBUM and an endless variety of ADIANTUMS. For the collector; PORTAFERRY FARM, ALBANY HWY, KELMSCOTT and BEV'S FERNERY, PITTS STREET, GOSNELLS are two that shouldn't be missed; from the latter I bought a lovely CYATHEA ROBERTSIANA. There are many others such as one that will be opening soon in NICHOLSON RD. CANNING VALE, which is a veritable suburb of nurseries, this one will be built like a Pioneer House complete with windmill and early relics and will sell lush baskets of NEPHROLEPIS varieties. All these, plus the advantage of the time difference which makes a phone order to Eastern State nurseries a cheap way of ordering, (although these nurseries prefer a cheque before dispatching one can find out what is available and arrange delivery) a phone call before 8 a.m. here is after 9 a.m. over there, two minutes to Queensland costs 72 cents.

During May, Bill and I travelled north on holiday with Betty and Sam Jack; in the Brisbane area we visited THE HAWKINS NURSERY GARDEN CENTRE 623 ALBANY CK. RD; ALBANY.TEL: 6241022. At the time of our visit, although they do not specialise in Native Ferns, Hawkins were selling potted ANGIOPTERIS ERECTA plants approx. 85 cm tall, for the very reasonable price of \$7.85, the proprietor told us that the few remaining ferns were all that were left of a consignment of 1,000 plants from 'up north', customers having bought them by the dozen; also they were the first successful result from three attempts to propagate the fern by tissue culture. Hawkins now anticipate regular deliveries from this supplier. In Brisbanes Eastern Suburbs, the LAKKARI NATIVE PLANT NURSERY 477 REDLAND BAY ROAD CAPALABA 4157. TEL:(07)206419, is a showplace where landscaped native plants demonstrate to the buyer the potential of plants for sale, they have an extensive range of ferns listed in their catalogue. Driving north the MONTVILLE NURSERY, MONTVILLE sold Australian Native ferns and also native and cultivated ferns from other countries, here we bought MICROSORIUM PUNCTATUM, POLYPODIUM GRANDICEPS, PTERIS PACIFICA, TECTARIA and PELLAEA ROTUNDIFOLIA (N.Z.). A few kilometres down the road to Nambour the LOTUS NURSERY looked promising but was closed on the thursday of our visit, they trade on weekends only. We telephoned and made an appointment with JOHN RAYNER 21 JEWETTS ROAD, NAMBOUR.4560. TEL:(071)457279. John deals in northern Queensland ferns, we bought small plants of ASPLENIUM BAILEYANUM, A. HOOKERANUM, A. PALEACEUM, A.PARVUM and A. WILDII for \$3.50 to \$4.50 each, John's A. ERECTA and MARATTIA SALICINA ferns were of a similar size and price. Larger plants of the beautiful ASPLENIUM LASERPITIIFOLIUM cost \$8.50, to see this fern is to love it and despite warnings that it will not tolerate cold, we could not leave without one each, resolving to nurse them through the winter.

Gwen Hardwick tells of a rewarding sojourn on the North-East coast of N.S.W. Whilst holidaying in June, Ken and I relaxed in the Taree/Port Macquarie area, there we visited the ELLENBOROUGH FALLS and the COMBOYNE district where we saw DOODIAS, BLECHNUMS, ADIANTUM, LASTREOPSIS, STAGS, ELKS & BIRDS NEST FERNS growing in profusion. SWAN'S NATIVE NURSERY, KENDALL RD,

COMBOYNE sell a good range of native and rainforest plants, here we bought a BURRAWONG PALM and a BLACKBOY at \$4.00 each. This nursery has an attractive display of ELKS, DAVALIA PIXIDATA and PSILOTUM all growing together. At ELANDS a small NURSERY ARTS and CRAFTS CENTRE, again sold ORCHIDS, STAGS, ELKS and BIRDS NEST FERNS, it was well worth visiting to see ASPENIUM FALCATUM and OPHIOGLOSSUM PENDULUM growing from a beautiful stag in their display area. We travelled through WAUCHOPE to HOWE'S NATIVE NURSERY at BEECHWOOD and saw their excellent display items (NOT FOR SALE) of large STAGS containing PSILOTUM NUDUM and OPHIOGLOSSUM PENDULUM. Here we purchased ASPENIUM FALCATUM, A. FLACCIDUM, OPHIOGLOSSUM LUSITANICUM and VITTARIA ELONGATA and after much coaxing the Proprietor weakened and sold us a magnificent STAG with PSILOTUM. At this nursery the ORCHID LOVER would delight in the abundance of QUEENSLAND ORCHIDS in flower.

Superb views from the scenic drive on BIG BROTHER MOUNTAIN and a walk in rainforest on its southern side, revealed the typical ferns previously mentioned plus, ARTHROPTERIS TENELLA cascading from trees and over rocks, MICROSORIUM SCANDENS, ASPENIUM FLABELLIFOLIUM and CYATHEA LEICHHARDTIANA. We also saw a beautiful colony of PTERIS UMBROSA and several varieties of PALMS. The largest nursery we visited was TATE'S NATIVE NURSERY, BEACH ROAD, DUNBOGAN. TEL:(065) 599684. The Proprietor, Jan Tate, has good access to the rare QUEENSLAND FERNS and TREE FERNS. Prices are reasonable with small plants \$2.00 to \$4.00, most TREE FERNS around \$4.00, SILVER ELKS \$5.00 and beautiful baskets of ferns range from \$8.00 to \$10.00. Plants for sale included CYATHEA BROWNII, C. LEICHHARDTIANA, C. REBECCAE, DRYNARIA RIGIDULA, SCHELLOLEPIS SUBAURICULATUM and S. cv. KNIGHTIAE, TASSELL FERNS, MICROSORIUMS and their cultivars and NEPHROLEPIS cultivars such as PRINCE OF WALES FEATHER. This is one nursery to which we will certainly return.

ANGIOPTERIS EVECTA: Attempts by members to grow this fern from spore, by applying techniques used in orchid growing have not, to date, met with any success. However - the current trend by commercial fern growers in propagating A. EVECTA by the use of TISSUE CULTURE is to be welcomed. Those of us who were concerned at the thought of this beautiful fern becoming extinct, may now even hope to see it replanted in the Rainforests of Northern New South Wales. (A future project for this group?) It is to be hoped that these same growers will now turn their attentions to another, equally, if not more threatened fern, MARATTIA SALICINA, which presents similar problems in propagation by traditional methods as does A. EVECTA. DON LOCH, from Gympie kindly sent us an excellent booklet on plant Tissue Culture prepared by the QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES, it is, HORTICULTURE BRANCH ADVISORY LEAFLET H.58, COMPILED BY F.D. HOCKINGS, DISTRICT HORTICULTURAL ADVISER, AUG. 1979. Following is the simple explanatory introduction which prefaces the very comprehensive descriptions of all stages of TISSUE CULTURE, EQUIPMENT, SOLUTIONS etc.

PLANT TISSUE CULTURE

Plant tissue culture is a method of plant propagation by growing small sections of dissected tissue on artificial media in sterile conditions. The concept of growing plants from individual cells was suggested as early as 1898 by the German botanist, Haberlandt, who tried to grow leaf cells in simple mineral solutions.

Plant tissue culture was used successfully in the 1930s by Gantheret (1939) in France and White (1934) in the U.S. The first practical use of

this technique came in 1952 when Morel and Martin succeeded in producing virus free dahlia and potato shoots and grafted them onto virus-free seedlings. For the past 45 years a considerable amount of experimental and empirical information has accumulated on plant tissue and cell culture; but, only in the past 5 or 10 years has the potential of this technique been widely recognised and applied to a variety of problems. A broad spectrum of plants can now be cultured, including bryophytes, ferns, gymnosperms, monocots and dicots. Tissues from almost every morphological structure in plants have been used for establishing cultures, including explants from shoot tips, root cortical tissue, hypocotyl, cotyledons, leaf, axillary buds, floral parts including ovules and anthers, and fruit parts including ovary wall, nucellus and embryo. Potentially any plant tissue comprised of living cells can be stimulated to proliferate as an unorganized callus tissue and be maintained indefinitely on a sterile nutrient culture if it is provided with the correct balance of essential inorganic ions, growth factors in the form of vitamins and amino acids, the appropriate balance of plant hormones, and an energy source usually in the form of sugar.

Tissue culture was first used commercially in 1960 for virus elimination and rapid multiplication of Cymbidium orchids, and was later used to propagate other types of orchids. Many species of plants can now be rapidly multiplied by tissue culture propagation and this has become the commercial impetus of the technique. Tissue culture propagation is widely used in nurseries in the United States and Europe and the technique is rapidly developing commercial application in Australia. Laboratories in Australia are successfully propagating orchids and ferns (particularly Boston type ferns and nephrolepis ferns) and are also experimenting with other species such as Bromeliads, Begonias and some Australian native plants.

A twelve week course on FERN IDENTIFICATION AND PROPAGATION will be held at MEADOWBANK TECHNICAL COLLEGE, CONSTITUTION ROAD, MEADOWBANK, on Tuesday evenings from 6 p.m. till 8 p.m. FEE: \$20.00

THE COURSE IS DIVIDED INTO TWO (2) SIX (6) WEEK PERIODS

FIRST SIX WEEK COURSE:

FERN PROPAGATION conducted by DAVID SONTER July, 14th, 21st, 28th, August 4th, 11th, 18th.

SECOND SIX WEEK COURSE:

FERN IDENTIFICATION conducted by VIRGINIA REED September 8th, 15th, 22nd, 29th, October 6th, 13th.

To reserve a place in this popular class ring MICHELLE VENESS 8071622 ex 36 or 38.

JULY 19th meet at the home of PHYLL and VIV. BROWN, 254 EDGAR STREET, CONDELL PARK, to identify ferns in their collection, ARRIVAL TIME AFTER 10.00 a.m., bring your own lunch.

AUGUST 23rd a walk in the BLUE MOUNTAINS, meet at WOODFORD, (ACROSS RAIL BRIDGE) at 10.00 a.m.

SEPTEMBER 19th & 20th BURRENDONG ARBORETUM visit. Travel by own transport. On-site caravans available at BURRENDONG CARAVAN PARK TEL: MUMBIL 35, or Motel accommodation in WELLINGTON. Please make your own reservations early to avoid disappointment. Fern planting on Saturday, B.B.Q. Saturday night, visit to RAINFOREST on CUDGEGONG RIVER Sunday morning (private property).

Phyllis - Murray LEADER
FERN STUDY GROUP.