THE FERN SOCIETY OF VICTORIA Inc.

REGISTERED BY AUSTRALIA POST: PUBLICATIONS No. VBH3411

NEWSLETTER

VOLUME 15, Number 1, February 1993

FERN SOCIETY OF VICTORIA Inc.

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SUBSCRIPTIONS:	Single		\$15.00	(Per	nsion	er/St	udent	- \$:	11.00)
	Family	_	\$18.00	(Per	nsion	ers -	\$13.	.00)	
	Overseas	-	A\$30.00	(by	Airma	ail)			
	Subscrip	tion	s fall d	ue on	1st .	July	each	year	

PRESIDENT'S MESSAGE:

Welcome to a bright New Year, but firstly, a thank-you to the persons who contributed to the success of the Christmas meeting - to those who donated items towards the raffles and also those who brought along a plate for the supper. And a special thank you to Mavis Potter who donated the Christmas cake for the raffle. Having had the pleasure of winning it myself, I can attest to its quality.

Our first meeting this year will feature Bill Taylor speaking on Maidenhair Ferns. Bill has an excellent knowledge of Maidenhairs and doubtless will convey this knowledge in his usual practical and downto-earth manner.

Fern Competition: Maidenhair ferns have been selected as the appropriate group for the fern competition this month. Please bring along at least one Maidenhair so that we may have the maximum possible range of Maidenhairs and have a massed display.

Osmocote: Osmocote is a first-class long-lasting fertiliser for ferns. Members can now buy Osmocote at meetings at an excellent price. Keith Hutchinson has arranged to provide it in two kilogram lots for \$10. Compare this with the average retail price of about \$5 for 500 grams. Keith will have some supplies available at the February meeting and is willing to continue to provide this service as long as there is a demand.

Fern Society of South Australia: We had a few members of the South Australian Society over in Victoria last year, and it was good to have two representatives at our October meeting when Barbara Hoshizaki spoke. As a follow up to this contact, the President of the South Australian Society, Ron Robbins, has invited our members to join in with them on their weekend excursion to the Otways. The precise date (continued opposite)

NEXT MEETING

- DATE: Thursday, 18th February, 1993.
- TIME: Commencing at 7.30 p.m.
- <u>VENUE</u>: The National Herbarium, Royal Botanic Gardens, Birdwood Avenue, South Yarra. (Melway Directory Ref. 2L A1)
- TOPIC: ADIANTUMS

SPEAKER: Bill Taylor

MEETING TIMETABLE

- 7.30 p.m. Pre-Meeting Activities: Sales of Ferns, Spore, Books and Special Effort Tickets ; Library Loans.
- 3.00 p.m. February General Meeting
 - 8.20 p.m. Topic of the Evening
 - 9.30 p.m. Fern Competition Judging Fern Identification and Pathology Special Effort Draw
 - 9.45 p.m. Supper
 - 10.00 p.m. Close.

The category for the Fern Competition this month is an Adiantum.

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DECEMBER FERN COMPETITION

The category for the fern competition for the December meeting was a fern native to England. Congratulations to the following winners:

First:	Dorothy Forte	Athyrium filix-femina cv.				
Second:	Dorothy Force	Osmunda regalis 'Cristata'				
Inira:	Tan Broughcon	osmanda rogaris orredat				

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PRESIDENT'S MESSAGE: (continued)

is uncertain but will probably be in late April. More details later, but persons interested in joining the South Australians can let me know. If there is enough interest we will arrange transport.

Regards, Barry White

SPEAKER REPORT - GENERAL MEETING - 17TH DECEMBER, 1992

Speaker: Keith Hutchinson

Subject: FLOWER FESTIVALS OF HOLLAND AND ENGLAND

Keith visited Holland and England in May, 1992, on a tour arranged by the Royal Horticultural Society of Victoria to coincide with the "Floriade 92" horticultural exhibition in Holland, a major event which is held only once every ten years. In 15 days they visited many spectacular gardens and floral displays in the two countries.

At the December meeting Keith gave an illustrated talk on the highlights of his trip with slides of his usual excellent quality. Keith has kindly provided the following notes:

HOLLAND

"<u>Floriade 92</u>" World Horticultural Exhibition: Japan had the main display of ferns with mass plantings of *Dryopteris* and *Athyrium* species and a very attractive dwarf *Adiantum*.

<u>Keukenhof Gardens</u>: Over six million Tulips with Dutch and Grape Hyacinths among magnificent green, purple and copper Beeches, pink Horse Chestnuts and Linden trees make these the world's best Spring gardens.

Alsmeer Flower Auctions: Some 14 million cut flowers and 1.5 million potted plants, including ferns, are sold daily. With 1,600 employees, this massive operation is superbly organised and brings Holland 4.9 billion guilders (A\$4.1 billion) annually.

ENGLAND

Touring through the Cotswolds we visited Hidcote Manor, Barnsley House and Kiftsgate Court gardens. The ferns were mostly *Polystichum setiferum* varieties with some beautiful specimens of *Dryopteris filixmas* and *Athyrium filix-femina* plus a few *Adiantum pedatum* and *Osmunda regalis*.

<u>Tiverton</u>: Our morning call here was to Knightshays Court where <u>Polystichum aculeatum and Dryopteris goldiana</u> were very lush and grew to about a metre high. <u>Blechnum penna-marina</u> formed clumps and had a copper-brown tinge to the fronds. In the afternoon we were given a guided tour of Tintinhull by Penelope Hobhouse, but ferns were not a highlight here.

<u>Stourhead</u> in Devon was easily the most picturesque garden we saw. First designed in 1721 with lakes and temples, it contributes to one of the most famous examples of the early English landscape movement. The ferns were an important part of this garden. Clumps of Athyrium filix-femina, Dryopteris filix-mas, Asplenium scolopendrium, Polystichum polyplepharum, P. munitum, Thelypteris palustris and Onoclea sensibilis were planted throughout the whole garden and Osmunda regalis in large numbers along the water's edge. As these ferns are completely deciduous in the U.K., they had just shot up out of the ground during the past month and were extremely lush and a magnificent sight. <u>Sheffield Park Garden</u>: We were told not to miss the fern gully here but were a little disappointed as, although there were many *Polystichum aculeatum* and *Dryopteris* species, they were almost hidden by Giant Gunnera and Hostas. Along the water's edge we found some lovely clumps of *Blechnum spicant*, aptly named the Ladder Fern.

The Great Dixter, home of the horticultural writer Christopher Lloyd, proved to be a highlight as Christopher gave us a guided tour and he named all his unusual ferns, many of which we had not seen before. Athyrium filix-femina 'Frizelliae' (the Tatting Fern) has narrow fronds with pinnae almost rolled into little balls each side of the rachis. Polypodium vulgare and P. australe 'Cambricum' were excellent with a neat clump of Gymnocarpium dryopteris (the Oak Fern) nearby.

The Wisley Gardens: This showpiece of the British Horticultural Society was truly wonderful. Formal gardens, cottage gardens, Rhododendron gardens and extensive rock gardens alive with ferns were featured. *Polystichum*, *Dryopteris* and *Athyrium* species abounded with *Osmunda* and *Onoclea* always by the streams and ponds. One would need about a week to really appreciate these gardens.

The Kew Royal Botanic Gardens in Surry were founded in 1759. They cover an area of 120 hectares with about 72,00 different plants in cultivation and receive over 1,250,000 visitors annually. A modern glasshouse, including a filmy-fern house, displayed some magnificent specimens. Angiopteris, Marattia, Leptopteris, Platycerium grande, Adiantum diaphanum, Diplazium bulbiferum and many rare tree-ferns were on display.

Just outside the glasshouse a section of garden featured more rare ferns planted in groups of five, each clearly labelled and well mulched as they were in quite a sunny position. A few of the outstanding species were

Athyrium filix-femina 'Victoriae' (Criss Cross Fern) Athyrium otophorum Cheilanthes lanosa (Hairy Lip Fern) Gymnopteris vestita (Mouse Ear Fern) Phegopteris connectilis Thelypteris decursive pinnata (fronds arched beautifully) Pseudo pmegopteris levencei.

The Chelsea Flower Show. This was a great finale to our tour and we were left without a doubt as to why this is said to be the world's leading horticultural event. Unfortunately there was only one fern nursery on display. With 31 overseas exhibits, including a unique one from Uzbekistan, Chelsea's Great Marquee was a seething mass of plants, flowers and people (42,000 were present). By 3 pm I was completely exhausted but very satisfied with my day at Chelsea.

The English people say that God created Heaven and called it Devon, but when I think of England I remember the rich green colour of all vegetation. A truly beautiful country.

President Barry White's thanks to Keith for a very entertaining evening were endorsed by the enthusiastic acclamation of members present.

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AUSTRALIAN TREE-FERNS

by Chris Goudey

(Conclusion of Speaker Report for October, 1992 Meeting)

The showing of slides of Australian and New Zealand tree-ferns continued with the balance of the species from mainland Australia and Tasmania:

Cyathea marcescens (Skirted Tree-fern) is a massive tree-fern with a crown of long arching fronds and usually has a large skirt of dead fronds attached. It is thought to be a hybrid between *C. australis* and *C. cunninghamii*, and is the only known tree-fern hybrid in Australia. It was originally thought to be the only species of fern endemic to Victoria, but in recent years a solitary plant has been discovered in NSW and some in Tasmania and on King Island.

Cyathea leichhardtiana (Prickly Tree-fern) occurs in moist gullies from East Gippsland right up the east coast to Eungella National Park inland from Mackay. It is an attractive plant but, as its common name implies, has sharp spines on its stipe bases.

Dicksonia antarctica (Soft Tree-fern) occurs in wet mountain gullies from southern Queensland through to Tasmania. Under good conditions old plants develop a massive trunk of soft fibrous roots.

Cyathea cooperi (Scaly Tree-fern) taken at Carnarvon Gorge in southern central Queensland - a dramatic shot looking straight up through the fronds and showing the walls of the Gorge on either side. This species occurs from Cooktown in Queensland to the Illawarra district in NSW.

Dicksonia youngiae (Bristly Tree-fern) is a rainforest species which occurs from central NSW to southern Queensland. It was originally thought to extend to north-east Queensland but in recent times the northern form has been separated and called *D. herbertii*. The difference is quite obvious when the species are grown side by side.

Cyathea rebeccae, which is found in Queensland north of Eungella National Park and also in parts of Malaysia, is an attractive plant with a very slender woody trunk. This has been placed by Holttum in a separate sub-genus with *C. baileyana*.

Cyathea robertsiana has a very slender trunk which has a fleshy green top. It grows in full sun on the tops of mountains in rainforest from Eungella to the Atherton Tableland. It is a quick-growing species which colonises freely, but is also very delicate and can be killed by relatively minor damage to the fleshy part of the trunk. It is a member of the Cyathea decurrens group of ferns which occur throughout the Pacific.

Cyathea baileyana (Wigged Tree-fern) is one of the rarer species in the mountains of north-east Queensland. It has a wig-like growth on the stipe bases at the top of the trunk.

Cyathea woolsiana is a large species quite common in north-eastern Queensland from the coast right up to the highest mountains.

Cyathea celebica is a rare and extremely handsome species from NE Queensland. It also grows in New Guinea and parts of Malaysia.

Cyathea excellis and C. fellina are fairly recent discoveries from Cape York. Slides of these were not available.

Lord Howe Island species were then shown:

Cyathea howeana is a small to medium tree-fern common on the upper exposed slopes of Mount Gower and Mount Lidgbird. It is closely related to *C. robertsiana* and is also a member of the *C. decurrens* group. A close-up view of a new crozier of *C. howeana* showed a mass of very broad scales which all drop off as the fronds uncurl.

Cyathea macarthurii is the most common tree-fern on Lord Howe Island. It was confused in the past with *C. dealbata* of New Zealand as the underside of the fronds in mature pressed specimens is often quite glaucous.

Cyathea brevipinna is a small to medium tree-fern which occurs only on the summits of Mt Gower and Mt Lidgbird. Its fronds are short and leathery.

Cyathea robusta (not illustrated) is the other Lord Howe species and is widespread at low to medium elevations. It is a robust plant with large erect tripinnate fronds and stipe bases covered with masses of large white scales.

Norfolk Island species shown were:

Cyathea brownii is a large majestic tree-fern which reaches 20 metres or more in height. The scales on the upper trunk and stipe bases are of two types, large pale brown and smaller dark brown.

Cyathea australis ssp. norfolkiensis resembles the mainland species but is a more robust fern and the scales at the bases of the fronds are shorter and darker.

New Zealand has some magnificent tree-ferns:

Cyathea dealbata (Silver Tree-fern or Ponga) is characterised by silvery white undersides to the fronds and stipes. This was emphasised in one of the slides taken at night with flash. This fern is the floral emblem of New Zealand.

Cyathea smithii is a giant species which is the most southerly occurring tree-fern in the world. It grows in rainforest on one of the sub-Antarctic islands.

Cyathea colensoi is an attractive prostrate tree-fern which grows in the southern parts of New Zealand and in the mountains further north.

Dicksonia lanata is another prostrate form which looks a little like Bracken.

Dicksonia squarrosa (Wheki) was illustrated by a stand on Stewart Island off the southern tip of N.Z. Like Cyathea rebeccae and C.baileyana, plants are stoloniferous and produce suckers so that they grow in clumps. This is a hardy fern and can be seen in southern areas, particularly in Milford Sound, growing right down to the high tide mark; it is not affected by salt spray.

Dicksonia fibrosa (Wheki-Ponga) has a fibrous trunk and is closely allied to the Australian D. antarctica, growing in similar conditions.

Cyathea medullaris (Black Tree-fern or Mamaku) was last but certainly not least, as it is a very robust plant with thick black stipes covered by black scales and with a large spreading crown of lacy fronds. It has one of the widest ranges of any tree-fern in the world, occurring from southern New Zealand through Fiji and across to Tahiti.

Chris extended his presentation to show a range of tree-ferns from Fiji (including *C. decurrens* mentioned above), New Caledonia, New Guinea and Zimbabwe.

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In contrast to the story in the December Newsletter about the environmental devastation caused by the rapid spread of Salvinia molesta, the following article tells of the benefits gained from the fast growth of another water fern, <u>Azolla</u>. The article originally appeared in the Melbourne "Age" of 29th August, 1989.

Fern and partner form a fine fixer

By JOHN TURNER

ANY readers will have seen the floating red fronds of the water-fern Azolla covering the surfaces of our billabongs, lakes and dams. Looking down from a plane descending over that wonderfully convoluted stretch of the Murray at Wodonga, I understood why the Chinese call this little fern Man-Chiang Hung — "whole river is red".

Years ago in Hawthorn we accidentally introduced Azolla into our large lily pool. All through the next summer we had to rake it off the surface — after all, one likes to see the water as well as the waterlillies. And the piles of red fern made excellent compost and mulch.

I did not know then that for 2000 years the people of Vietnam and southern China have used this fern in medicine, as forage for fowls and especially as green manure in their rice fields. Until recently they grew only the native species *A. pinnata*, but a few plants of *A. filiculoides* were imported from East Germany in 1977. Unlike the native species this was frost-hardy and it became possible to extend its use to northern parts of China.

It is not advisable in general to introduce foreign plants to areas where they may become pernicious weeds, but Azolla cannot withstand drought and is readily harvested from water surfaces.

The Chinese farmers grow it in special pools until the rice is planted; it is then transferred to the paddy fields and incorporated as manure into the muddy soil just as the rice plants begin to elongate.

Possibly the farmers used Azolla because it grew so rapidly — it can double its area in two bright summer days. Perhaps they suspected that the fern had some special property — if so they were right. For Azolla lives in a close partnership with another organism, Anabaena, a filamentous blue-green alga that has the power to fix nitrogen with the help of solar energy.

Nitrogen is one of the chemical elements essential to all life and it is present in enormous quantities in our atmosphere, as the gas nitrogen. But this is a very stable substance and before plants can use it it must be "fixed" or combined with other elements, such as hydrogen.

Nitrogen "fixation" is a chemical process that occupied the full-time attention of the world's best chemists in the early years of this century. It became the basis of a chemical industry that today produces millions of tonnes of nitrogenous fertilisers every year.

Each Azolla plant has a delicate branching stem with lobed overlapping leaves, each plant varying in size from one to seven centimetres in diameter. It grows by vegetative propagation - as the old stem rots away it releases its branches to form separate new plants. In spring the plant is green but a red masking pigment develops in the summer. It is the green chlorophyll pigment that enables the leaf to utilise solar energy, to photosynthesise - to build the carbon in the carbon dioxide gas in the air into food substances like sugars.

The fern's partner, Anabaena, forms microscopic chains of living cells also capable of photosynthesis, and the combined rate of this process in fern and partner is unusually high. The algal chains live tangled together in pouches in the lower leaf lobes of the fern.

Today, two scientists, David Hall in London and Ding-Ji Shi in Beijing, are investigating Azolla's partner, to see if they can suggest a cheaper way of fixing gaseous nitrogen. We know that Anabaena uses solar energy, nitrogen gas and the hydrogen in water (all for free, as they say) when it makes ammonia. When Anabaena is grown alone, it fixes little nitrogen; when trapped and immobilised in the fern leaf the nitrogen fixation becomes very active.

These scientists have found that the fern can be replaced by sheets of wet plastic foam, immobilising the Anabaena; when these sheets are sunlit, enhanced nitrogen fixation also occurs and the ammonia so formed may be collected. Largescale production of fertilisers by Anabaena has not yet been achieved. And we should remember that Mother Nature still has the edge on man. The frost-free Azolla introduced into China was spread by farmers over 250,000 hectares of water in two years. Just think about that area of plastic sheets.

This article is based on a more technical account in 'Plants Today', volume one, number one, 1988, obtainable from Blackwell Scientific Publications, PO Box 88, Oxford, England. I recommend this journal to gardeners with an interest in plant science.

FERNS REPRODUCE MANY DIFFERENT WAYS

(This article is taken, with thanks, from the June, 1992 issue of "Fern World", the newsletter of the San Diego Fern Society.)

The normal life cycle of a fern is a complicated process. The fertile frond of a mature plant produces thousands of spores. Spores are germ cells with one half set of chromosomes (chromosomes in most cells are paired, but germ cells only have one of each chromosome).

Some of these spores land in favourable spots and germinate. The spore quickly develops into a generally heart-shaped structure called a prothallus. The prothalli lack true roots, but are anchored to the surface by root-like structures called rhizoids. The prothallus develops male (antheridium) and female (archegonium) sexual organs. The antheridium develops sperm and each archegonium contains a single egg. The sperm and eggs each still have only half a set of chromosomes.

The sperm swim to the eggs on a thin film of water present on the surface of the prothallus. At fertilization the sperm cell and the egg cell combine to form a zygote, containing a complete set of chromosomes. The zygote develops into a fern or fern ally, known as the sporophyte. The sporophyte grows into a mature plant with its own fertile fronds, and the process goes on.

But... ferns also have other ways to reproduce which serve to increase their ability to survive in harsh environments. Two of these are called "apogamy" and "apospory".

APOGAMY:

This is a form of reproduction where the sexual fusion of the gametes (egg and sperm) is bypassed and the sporophyte arises directly from vegetative buds formed on the cushion of the prothallus. This is a form of vegetative reproduction that is dependent on a set of unusual events during the cell divisions leading to the development of the spores.

During division by mitosis the number of chromosomes first doubles and then, after the cells split, each cell has a normal complement of chromosomes. In the



complement of chromosomes. In the process leading to apogamy, the number of chromosomes doubles but, for some reason, the cell does not divide, leaving it with a double set of chromosomes.

During meiosis (which leads to the production of spore cells) the chromosomes do not double so, as the cells divide, each spore cell gets only one of each pair of chromosomes. However, when the cells start out with double chromosomes, the spore cells each end up with the same number of chromosomes as the parent plant. Prothalli from spores with the full complement of chromosomes can give rise to a new sporophyte by a form of budding. This process is very important and common among plants which live in dry habitats, such as species of *Cheilanthes* and *Notholaena*. Using this reproductive method there is no requirement for free water during fertilization. The process of apogamy is now known to be widespread among other ferns as well. Species which frequently reproduce by this method include *Cyrtomium falcatum*, *Pteris cretica*, *Athyrium filixfemina* cultivars, *Phyllitis scolopendrium* and *Polystichum setiferum*.

Apogamy is also very interesting to fern botanists because it can result in ferns with unusual numbers of chromosomes. The work currently being done by Mike Windham and Dave Benham with the *Astrolepis sinuata* complex indicates the variations in form that may be the result of an array of apogamous chromosome combinations.

APOSPORY:

Apospory is not nearly as complex as apogamy. This form of vegetative reproduction eliminates spores entirely. Apospory occurs when a prothallus develops directly from a cell on the frond of a sporophyte. In most cases this prothallus replaces sporangia (spore cases) and develops directly from the sorus, but there are known cases where the prothallus can grow as a continuation of the tip of the frond.



Aposporous prothalli can develop antheridia and archegonia in the normal fashion. However, in some cases apogamy can occur, adding further complications.

A clear and detailed explanation of the reproductive cycles of ferns and fern allies is found in the "Encyclopaedia of Ferns" by David L. Jones (1987). Much of the material used in this discussion has been developed from Jones' descriptions.

(The illustrations in this reproduction of the article are copied directly from "Encyclopaedia of Ferns".)

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And from an earlier edition of "Fern World":

A lady walks into a florist and says, "I need two dozen anemones for a floral arrangement." The florist replies, "I don't have that many anemones, but I have some very lovely fern fronds to help fill out the arrangement. Perhaps that will do." The florist shows the woman the ferns. "Splendid," says the woman, "I will just take the ferns. With fronds like these, who needs anemones."

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DECEMBER MEETING WINNERS

Door Prize: Mavis Potter

Special Effort:

Barry White (2) Margaret Radley Norma Hodges Ian Broughton (2) Mary Frost Bernadette Thomson Keith Hutchinson Dave White Noel Kerr (2) John Hooper Joy Horman



BUYERS' GUIDE TO NURSERIES

VICTORIA:

Andrew's Fern Nursery - Wholesale and Retail. Melbourne Road, Arcadia, 3613. Ph: (058) 26 7285. Large range of ferns for beginners and collectors. Open daily 10 am - 5 pm except Christmas Day.

Austral Ferns - Wholesale Propagators. Ph: (052) 82 3084. Specialising in supplying retail nurseries with a wide range of hardy ferns: no tubes.

Dingley Fern Market - Wholesale and Retail. Ph: (03) 551 1868. 233 Centre Dandenong Road, Dingley, 3172. Specialising in Ferns, Palms, Indoor Plants, Orchids and Carnivorous Plants. Open daily except Christmas Day.

Fern Acres Nursery - Retail. Kinglake West, 3757. Ph: (057) 86 5481. (On main road, opposite Kinglake West Primary School). Specialising in Stags, Elks and Bird's-nest Ferns.

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

R. & M. Fletcher's Fern Nursery - Retail. 62 Walker Road, Seville, 3139. Ph: (059) 64 4680. (Look for sign on Warburton Highway, 300m east of Seville shopping centre). Closed Tuesday, except on public holidays.

Ridge Road Fernery - Wholesale and Retail. Weeaproinah, 3237. Ph: (052) 35 9383. Specialising in Otway native ferns.

Viewhaven Nursery - Wholesale and Retail. Avon Road, Avonsleigh (near Emerald), 3782. Ph: (059) 68 4282 Specialists in Stags, Elks, Bird's-nests and Native Orchids.

NEW SOUTH WALES:

Jim & Beryl Geekie Fern Nursery - Retail. By appointment. 6 Nelson Street, Thornleigh, 2120. Ph: (02) 484 2684.

Kanerley Fern Exhibition and Nursery - Wholesale and Retail. 204 Hinton Road, Nelsons Plains, via Raymond Terrace, 2324. Ph: (049) 87 2781. Closed Thursdays and Saturdays. Groups of more than 10 must book in advance, please.

<u>Marley's Ferns</u> - Retail. 5 Seaview Street, Mt. Kuring-gai, 2080. Ph: (02) 457 9168.

QUEENSLAND:

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