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NEW ZEALAND PLANTS AND GARDENS

The Official Journal of the Royal New
Zealand Institute of Horticulture (Inc.)

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GREETINGS

Another pleasing year is drawing to its close, and it affords me much pleasure to convey to all members Christmas greetings.

We horticulturists, either as professionals or amateurs, are probably aware of the important place that Horticulture plays in our economy, and the pleasure we receive from being associated with it. However, it is gratifying to note that the Hon. Mr. Talboys is aware of this fact, and mentioned at our last Conference that horticultural products produced in New Zealand exceeded £30,000,000. Now, following representations made by the Institute, both Massey and Lincoln Colleges have recognised this fact, too, by establishing Chairs in Horticulture. This year has also seen the establishment of the new Poverty Bay District Council, centred in Gisborne.

Our Institute is in good heart, and may the spirit of helping others, as well as ourselves, continue through 1964. May your interest in Horticulture also continue to grow. My wish to you all is that you have a very pleasant Christmas and that 1964 will prove to be a happy, enjoyable and rewarding year.

J. F. LIVING,
President.

A HORTICULTURAL JOURNEY TO WESTERN AUSTRALIA

(1)

W. R. STEVENS (*Wanganui*.)

My first acquaintance with the Australian flora was made in 1919, when I was on a visit to New South Wales. In those days Sydney had not spread out so much and there were many areas close to the city which contained a veritable treasure chest of wild flowers. Despite my ignorance of plants I recognised even then that here was a field

that should be investigated for plants possible to be grown in New Zealand. At that time there was no Wild Flower Protection Act and the flower stalls in Martin Place were a riot of wild flowers. I can well remember the bunches of Christmas Bells (*Blandfordia nobilis*), Flannel Flower (*Actinotus helianthii*), Christmas Tree (*Ceratopetalum gummiferum*), and, of course, Waratahs (*Telopea speciosissima*) that were on sale.

During the next 20 years I visited Eastern Australia several times, each time collecting a few seeds. But it was not until a collector in Western Australia sent me seeds of some outstanding endemic species that my interest really crystallised. When in 1935 I flowered for the first time such items as *Pimelea physodes* (see photograph), *Beaufortia sparsa*, and *Agonis juniperina* I knew beyond doubt that from then on my main interest would be concentrated on the flora of Western Australia. By that time I was receiving numerous packets of seed of species completely unknown to New Zealand gardens. Some germinated quite freely but many others failed completely. One plant in particular, *Darwinia meeboldii*, then newly discovered, had defeated all my efforts to raise it from seed. I mentioned my difficulty with this subject to the collector who very kindly sent me a well established plant of it, in an earthenware pot. This was in the days before there was such a thing as air mail and the potted plant was despatched to me by parcel post. Despite its long journey it arrived in perfect condition, was planted in the light alluvial soil of my Bulls garden, and flourished. It eventually grew to five feet, flowering regularly every year. Incidentally I cannot imagine acquiring a rare plant — or any plant for that matter — in this way nowadays, with plant quarantine regulations being what they are!

The failure to germinate the seed of some of the Western flora was not the only problem to confront me — I found that some plants that I did succeed in germinating did not establish well. From this I began to wonder if these plants required special soil conditions. In the following years failure to succeed with certain plants built up in me a sense of frustration, and I finally decided to go to Western Australia to see if I could find the answers. I reasoned that if I could study the conditions under which the plants were growing in nature I could then try to emulate these conditions so far as it would be possible in this country. How correct my reasoning proved to be will be told in these articles.

When, early in September 1961, we left for Western Australia our party consisted of myself, and my wife, and Messrs Harry Chittick and Noel Ginn. The latter are enthusiastic plantmen who already possessed something more than a nodding acquaintance with Australian plants.

On arrival in Sydney we were met by that internationally recognised plantsman, Mr Walter Hazelwood, who very kindly drove us to various places on the Hawkesbury River. Part of the drive was

through Kuringai Chase, an extensive protected area for native plants and animals. Some choice plants were in flower, notably *Crowea lanceolata*, *Boronia serrulata*, and *Isopogon anethifolius*. Incidentally I do not know of anyone in New Zealand who has successfully grown *Boronia serrulata*. It occurs generally in slight depressions, which being in areas of good rainfall, retain moisture all the year round. *Crowea lanceolata* is apparently very difficult to propagate either from seed or cuttings, and this will always be a scarce plant in cultivation. A plant of it which I brought back to New Zealand in 1949 is still growing well with me, although it has the reputation of not being long lived in nature.

An outstanding tall shrub occurring in isolated areas around Sydney aroused our attention. This was *Pultenaea flexilis*, a leguminous shrub with masses of rich yellow flowers and dainty fine foliage. As a prelude to our trip this excursion into the New South Wales bush was both exciting and satisfying.

In Melbourne we spent a few hours with Mr J. H. Willis, Director of the National Herbarium, and then boarded our plane for Perth.

In an early discussion on our plans for the trip we had realised that the best way to see as much as possible of flowers growing in the wild would be to hire a caravan. This had been arranged before we left New Zealand and a car and caravan were to be ready for us two days after our arrival in Perth.

At this stage I think it would be advisable to state that this trip was not intended to be a botanical expedition. We were *not* botanists, but horticulturists, and our objectives were to see as much as possible of the flora and to study the conditions under which it grew. A further object was to collect seed where possible and Harry Chittick hoped to get a good collection of colour photographs. Our original intention had been to travel north of Perth first, as we presumed there would be more in flower up there at this date than in the south. But a letter from Alf Gray, the wellknown seed collector of Albany, had advised us to come south immediately on arrival as a large number of plants were already in full flower, the season being unusually early there. So much for our plans!

We arrived in Perth very late at night, to be met there by an old friend of mine, Harry Kretchmar, a biochemist by profession whose hobby was the colour photography of wild flowers. He had made many trips north of Perth and knew most of the best areas for flowers. When he heard that we were proposing to go south immediately he told us we were making a mistake and that if we did not go north first we should miss the amazing display of all the Everlastings. He was so emphatic about it that we almost wavered in our decision. When we said that all our plans were made and a schedule drawn up he

just said 'Well, alter them! And I'll drive you up north this week-end'. By this time it was after midnight and the discussion seemed likely to go on all night. In the end we capitulated — it seemed the easiest thing to do. We were all tired after our long trip and all we wanted was to get to bed.

So next day we spent quite a time sending telegrams and ringing up various people to say that we should not be there on the dates previously arranged, but would arrive some three days later. In our discussions with Harry Kretchmar we had pointed out the uncertainty of getting accommodation for all of us without arranging it ahead. But he had blithely assured us that we should have no trouble. With a full load of car passengers there was not much room for luggage, so we had all of us to be content with a small overnight bag of the bare necessities.

It was a clear sunny morning when we left Perth and none of us except Kretch knew how far or in what direction we should be travelling. The car was a 'souped up', almost new Rover, capable of high speeds, but Kretch is a superlative driver. About 30 miles north of Perth we came to Bullsbrook, where a short stop was made to let us have a look at the plants growing on the sides of the road. The first plant we identified was *Boronia purdeana*, which still had a few flowers left. Rather an untidy little bush, but the yellow flowers had that unmistakable *Boronia* perfume. In a damp depression a few old clumps of *Anigosanthos humilis* were in flower, and further along some specimens of *Regelia inops* — not yet in flower. In the deep sand were large specimens of *Banksia ilicifolia*. These were about 20ft. high with a few dull red flowers, which resemble *Dryandra* rather than a *Banksia*. Not an inspiring tree by any means, but it is a strangely typical member of its genus and we were glad to have seen it. In passing I would suggest that it is just as important for a horticulturist to have an acquaintance with plants of little or minor merit as it is to know those of great merit. All is grist that comes to the horticultural mill! In this particular case it follows that I would not now plant *Banksia ilicifolia* in my garden except for purposes of study and as a matter of interest.

WAR CEMETERIES

D. C. MACKENZIE, N.D.H. (N.Z.) A.H.R.I.H. (N.Z.).
Supt. of Parks & Reserves, (Palmerston North.)

During a recent visit overseas the writer had the opportunity of inspecting a small part of the work which is undertaken by the Commonwealth War Graves Commission in the development and maintenance of War Cemeteries. These cemeteries are a poignant reminder of the sacrifices made in two major wars, and what is being done by the Commission to make the cemeteries places of beauty and tranquility, often under difficulties, is to be commended.



*HORTICULTURAL JOURNEY TO WESTERN AUSTRALIA —
Pimelea physodes (Qualup Bell).*

(W. R. Stevens)

(See page 192)



*WHAT MAKES A GOOD GARDEN — Informal Planting and
Mixed Textures.*

(Stewart Studios)

(See page 196)



THE SOULANGEANA CLAN — Magnolia lennei.

(Photo Douglas Elliott)

(See page 203)

The work and activities of the commission are many and varied for over the past centuries wherever British armies fought they left their dead, and it is the care and maintenance of the cemeteries and individual graves which is the paramount work of this body.

Theirs has not been an easy task for many of the cemeteries have had to be formed and planted in lands which are harsh and inhospitable in climate and aspect, while others again, mainly in the temperate regions, lend themselves to the use of that plant material which will give the maximum effect in form and colour.

Whenever possible use seems to have been made of plants which are native to the country concerned, but the Commission has not hesitated to introduce subjects once they have proved themselves as suitable to the area.

It is understandable that special attention was paid personally to those cemeteries which contained graves of New Zealand War Dead, and on the writer's return to this country the matter was brought up at an executive meeting of the Dominion Council: 'Would it not be possible for more New Zealand Native plants to be used in these cemeteries?' It was felt that it would assist in creating a suitable atmosphere in those cemeteries which contain a large number of New Zealand dead to have some representation of our local flora planted. A most sympathetic reply has been received from the Horticultural Officer to the Commonwealth War Graves Commission and a start has already been made on the propagation of many of the more representative and distinctive trees and shrubs of New Zealand, to be planted, especially in the European and Mediterranean areas.

A great deal of thought, and vision, must have been exercised in the selection of many of the War Cemetery sites. These are often in a prominent position, and yet isolated from built up localities and have an identity all of their own.

The forty-second annual report (1961) of the Commonwealth War Graves Commission describes the landscaping and planting of the cemeteries:

'A visitor to the cemeteries of the 1939-1945 War in Beirut, Alexandria, Nairobi, Melbourne or Delhi would not find it difficult to imagine that he stood in one of the "Silent Cities" of Flanders or the Somme. Lawns, wherever they can be made to flourish, provide a green setting for the colourful borders planted along the lines of headstones. In many of these places and in others even more remote, the familiar rose thrives in the borders, while other plants of warmer climates, such as *Oleander*, *Hibiscus*, *Bougainvillea*, and *Poinciana*, contribute to the decoration of the cemeteries and, with careful arrangement of their stronger colours, to the effect of peace and quiet beauty.'

In a prominent position in the cemetery is the 'Cross of Sacrifice' of a simple and symbolic design. It predominates the garden and burial areas and unites them into one.

WHAT MAKES A GOOD GARDEN?

DOUGLAS ELLIOTT (*New Plymouth*)

Have you noticed that some gardens have a special charm quite independent of flowers or design? They may not contain choice plants and the lay-out might possibly make a landscape architect shudder, and yet there's something about them that makes you feel they are just right.

What I'm trying to get at is a bit hard to explain. But you're conscious of the same kind of thing when you go into some houses. You sense that the owners have made real homes that radiate an atmosphere of comfort, and again the result is independent of the design of the building or the quality of the furnishings.

Now I don't think for a moment that there are any hard and fast rules to be followed in achieving this kind of garden. I suspect the owners of such places have an instinct about it all and would quite likely be at a loss if you asked them for the recipe.

But there are some particular features I've noticed about these gardens and I think it worthwhile to discuss them.

Firstly the plants appear to feel at home. They look the very opposite of plants in a nursery. They may not be perfect specimens. Indeed they will often have crooked trunks or a lop-sided shape through rubbing shoulders with one another. In other words they possess individuality and that's one of the main reasons they appeal to us.

There are no straight rows of plants or continuous edgings of one kind of plant. Instead there are little groups of different plants and the edging will be broken up by the different kinds. Think how much better this is than a long monotonous line of some such thing as the much over-used fibrous begonias. Groups look more natural because they *are* more natural. One *Lachenalia* bulb, for example, will in time form an interesting group but not in a thousand years will it form a row.

This system is a little informal compared with the straight-row type of garden. And that very lack of formality is another part of the charm. It gives the garden that lived-in feeling which I myself greatly prefer to the discomfort of over-tidiness.

The good gardener groups his shrubs and trees in interesting combinations of shapes. This adds much more permanent interest to the lay-out than mere flowers, which no matter how beautiful they are, are only temporary. And incidentally I don't think you can have a very good garden without some shrubs and trees.

Most shrubs and trees are more or less spherical and can look a bit dull in the mass. So the secret is to include uncommon shapes to add variety and contrast.

What are some of the uncommon shapes?

Probably the most obvious are the cone-shaped conifers. (This sounds a little repetitive but conifers are not named after their shape but after the cones they bear and some are not cone-shaped). Their slender spires are very distinctive and immediately add contrast.

Then there are the plants with erect branches such as the Lombardy poplar, the Irish yew, and some other conifers. They are so very distinct that they must be used with restraint.

A few trees are what you might call vase-shaped. Their branches grow upwards and outwards from the base like the outline of the typical flower-show vase and form a spreading crown. The golden elm (*Ulmus procera* 'Van-Houttei'), the willow-myrtle (*Agonis flexuosa*), and our native kowhai are examples.

The weepers are very distinct and come in two kinds, the formal umbrella shape (weeping elm, weeping cherry) and the informal in which the branches do not come from one point as in the others but start out like those of a normal tree and grow more or less upright before they weep. Examples: weeping willow and mature specimens of some of the magnolias, flowering apples, and flowering cherries.

A few plants have horizontal branches: horizontal elm and some of the conifers, especially the dwarf junipers. *Viburnum tomentosum* and its variety 'Plicatum' have more or less horizontal branches which are more noticeable when loaded with the white flowers.

Now, how are we to use these shapes to make our gardens good gardens? We can combine them in groups so that their contrasting lines and heights make interesting compositions. An example: The vertical Irish yew contrasts very definitely with round plants, weeping plants, horizontal plants.

To give it its full value we should keep away any competing plants such as the pointed conifers. We should also allow it to make the most of its vertical line by planting only low things in front of it. Other tall plants, irrespective of shape, should be kept at a little distance. A very effective grouping could be made with some of the horizontally branched junipers such as *Juniperus communis* 'Depressa Aurea' at its foot and perhaps to one side a weeper such as *Acer palmatum* 'Dissectum'. This would also give contrast of colour.

We've seen the value of grouping one kind of small plant such as *Lachenalia*. Sometimes a group of one kind of shrub or tree is very effective. They will usually look more natural if you plant different sizes with the smaller ones at the front. And usually it's best to plant in odd numbers as this makes grouping easier. I remember seeing a good group of the dwarf upright juniper (*J. communis* 'Compressa') in a large rock garden. Silver birch group well and if you plant them 1½ ft. to 2 ft. apart they will be forced to develop interesting lines in their trunks.

Texture is another property of plants that is well used in the good garden. A particularly good example occurs in one of the best Taranaki gardens. The dominant plant in this group is an umbrella pine (*Sciadopitys verticillata*), whose foliage looks like hundreds of tiny umbrellas or sun-shades waiting for their covers. The shape is conical, but not sharply so and the colour dark green. At its foot is a clump of dwarf red flax (*Phormium tenax* 'Rubrum') whose spiky leaves as well as its colour make a good contrast. A third plant is the skeleton plant (*Calocephalus brownii*) with silvery, almost white, stems and a cushion shape.

Small plants — perennials, bulbs, rock plants — are a wonderful help in giving your garden a 'lived-in' look. They cover bare ground and soften the otherwise hard line between the edge of the lawn and the shrubs.

By the way, talking of the edge of the lawn, this is another thing that can have a surprisingly big influence on the total effect. I like grass edges. For three reasons: they are easy to alter, they are inconspicuous, and when shrubs or ground-cover smother them they can be forgotten. I've never yet seen a hard concrete edge look right. But if you must have some kind of permanent edge, try bricks or paving blocks either rectangular or 'crazy'. The overflowing plants soften the rather hard line.

Your small plants offer great scope for interesting combinations of shape and texture. One that comes to mind was at the same time — at least when the plants were flowering in the spring — a good contrast in colour. The main plant was what some folk call Michaelmas daisy bush (*Felicia angustifolia*, or if you're really fussy, *Aster fruticosus*); the secondary plant was basket-of-gold (*Alyssum saxatile*). There was contrast of height, not so much contrast of shape, for both were more or less cushion shape though *Felicia* could be shaped differently by pruning. There was contrast of texture with small very narrow bright green leaves on the *Felicia* and much larger, soft, silvery-green leaves on the *Alyssum*, heliotrope daisy flower on one and masses of very small golden ones on the other, out at the same time though the *Alyssum* has a much longer season.

Just as we found distinct shapes amongst the trees so we have distinct shapes and textures amongst the perennials. Two that are very useful are the plantain lilies (*Hosta*) and the spiraeas (*Astilbe*). Several of the plantain lilies have large, handsome boldly sculptured leaves. Three of my favourites are *H. glauca* (extra large blue-green leaves), *H. plantaginea* (very light green and fragrant white flowers), and *H. ventricosa* (slightly smaller, normal green). There are several very good variegated forms. The astilbes are the exact opposite, light and fernlike, some of them strongly tinged with red, especially when they first unfold. The feathery upright spire-shaped flower-heads are another bold shape. These two and the spear-leaved Japanese *Iris* combine well and also grow well in damp soil.

This kind of garden is easier to look after than the tidier and fussier garden full of annuals, which are in straight rows or in huge masses of unrelieved sameness. It's the kind of garden that more or less looks after itself throughout the summer. Finally, it's the sort of garden that can be lived in.

NATIONAL DIPLOMA IN APICULTURE

The Royal New Zealand Institute of Horticulture is pleased to announce the award of Diplomas in Apiculture without examination to persons over 40 years of age who have had at least 20 years experience in Beekeeping. Authority of the issue of these Diplomas by the Institute was obtained through an amendment to the Royal New Zealand Institute of Horticulture Act 1957. It is hoped that these senior citizens in Beekeeping will encourage younger men and women in the industry to study for and sit the examinations for this Diploma which is the only Beekeeping qualification available to this country. Anyone interested should write to the Secretary of the Royal New Zealand Institute of Horticulture, P.O. Box 450, Wellington.

In reporting on his visit to the United Kingdom in 1952, the Director of the Horticulture Division of the Department of Agriculture stated that a National Diploma in Beekeeping was being considered by the Beekeeping Education Association which aims to have a Diploma of equal standard to the National Diploma in Horticulture granted by the Royal Horticultural Society and recognised by the United Kingdom Ministry of Agriculture as a suitable qualification for Horticultural advisory officers. Mr Greig then stated, 'I feel the time has arrived when the National Beekeepers' Association of New Zealand in co-operation with the Horticulture Division should discuss a similar series of recognised qualifications for New Zealand Beekeepers from whom future Apiary Instructors could be recruited. Such a move will have my personal interest and support.'

In 1956 the National Beekeepers' Association decided to approach the Royal New Zealand Institute of Horticulture with the object of establishing a Diploma in Beekeeping and the following year the Institute's Act was amended to cover Beekeeping as well as Horticulture. Discussions then took place between the Institute's Examining Board (under Professor H. D. Gordon), the Superintendent of the Beekeeping Industry and the executive of the National Beekeeping Association which culminated in approval of a draft syllabus in 1959. By taking the full course of study and gaining the practical experience required a candidate must have a minimum of six years practical experience in handling bees and then pass in 9 written papers, 3 oral examinations, and submit a Thesis, before being awarded National Diploma in Apiculture, the hall mark of the all round practical Beekeeper. The Royal New Zealand Institute of Horticulture has commenced to register students and to set examinations for this Diploma. On the establishment of such a Diploma it is customary and fitting to make awards, without examinations, to those of recognised standing and experience in the industry. The Executive of the National Beekeepers' Association has given this move its full co-operation and support.

The list of Honorary Diplomas hereunder is a complete list of such awards as authority to issue these without examination has now expired.

HONORARY DIPLOMAS IN APICULTURE.

ABERNATHY, R. C. (Owaka)	ASHCROFT, W. J. C. (Havelock North)	BENNIE, R. D. (Ranfurly)
ADAMSON, W. H. (Wedderburn)	BALL, E. O. (South Canterbury)	BENNETT, A. W. (Frankton)
ARMSTRONG, F. J. (Christchurch)	BASSETT, W. G. (New Plymouth)	BERRY, P. (Havelock North)

BOX, L. I. (Heriot)	HIGGINS, J. C. (Waihi)	PALMER-JONES, T. (Wellington)
BRISCOE, D. A. (Tauranga)	HIGHT, E. B. F. (Tinwald)	PARKES, R. A. (Tauranga)
BUSH, H. (Blenheim)	HILL, C. W. (Rangiora)	PATERSON, C. R. (Tauranga)
BUSHBY, R. R. (Christchurch)	HOBBS, R. H. (Gore)	PEARSON, T. E. (Darfield)
CALDWELL, W. J. (Invercargill)	HILLARY, W. F. (Papakura)	PENROSE, T. F. (Summer)
CLOAKE, H. (Timaru)	HOLDAWAY, H. R. (Whangarei)	RIESTERER, L. (Papatotetoe)
COOMBES, W. A. (Lumsden)	JENNINGS, W. (Timaru)	ROBINS, P. R. (Tai Tapu)
CROPP, L. T. (Richmond)	JOHNSON, L. H. (Palmerston North)	SIMPSON, A. H. (Geraldine)
CROPP, T. A. (Richmond)	KNIBB, H. G. (Geraldine)	SMAELLIE, E. (Wellington)
DAVIDSON, R. (Timaru)	LLOYD, J. (Manaia)	SPENCE, J. S. (Gore)
ELLIOTT, E. W. (Amberley)	LORIMER, J. D. (Hamilton)	TOOGOOD, G. F. (Gore)
FORSTER, I. W. (Oamaru)	LOWE, J. H. (Tauranga)	TUCK, H. N. (Kihikihiki)
FORSTER, J. (Timaru)	LYTTLE, L. G. (Timaru)	WALSH, R. S. (Auckland)
FORSYTH, B. W. (Ohaupo)	McFADZIEN, J. (Havelock North)	WATSON, J. H. (Geraldine)
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GLASSON, R. V. (Blackball)	MARSH, C. L. S. (Ethrick)	WILTON, F. F. (Otaki)
GLYNN, J. (Balfour)	NELSON, W. W. (Takapuna)	WYNDHAM, C. F. (Balclutha)
GRIFFIN, L. A. M. (Christchurch)	NEWTON, R. H. (Ashburton)	WINTER, T. S. (Paekakariki)
GUMBRELL, G. E. (Geraldine)	OLSEN, M. H. (New Plymouth)	
HAINES, W. I. (Kaitaia)		
HERRON, W. T. (Gore)		

THE SOULANGEANA CLAN

SOME EARLY MAGNOLIAS

A. W. ANDERSON, A.H.R.I.H. (N.Z.), (Timaru).

Best known of all the early flowering magnolias is *M. soulangeana* whose great white, purple-stained blooms do so much to brighten up the spring garden. Together with its parents and offspring it forms a very well defined group of flowering shrubs or small trees. The most desirable one is undoubtedly the Yulan which, after being known for about a century as *M. conspicua*, spent a few years as *M. heptapeta* before settling down, permanently one hopes, as *M. denudata*. The other parent *M. liliflora* has also had a chequered career and may be found in the older reference books under such names as *M. obovata*, *M. denudata* and *M. purpurea*. All very confusing, especially for the amateur gardener who is used to calling a spade a spade. The reason

is that the International Rules, which govern the naming of plants, state that the name given when the first description of the species was published is the only valid one. This may be very complicated in practice because one or more species may have been confused with the one in question, first descriptions were sometimes too inaccurate for a correct diagnosis and were often published in little-known books or magazines. So the various name changes are all made in attempts to apply the rules.

The Yulan

Grown in its native China for some 13 centuries the Yü Lan or Lily Tree *Magnolia denudata*, must be among the oldest species in cultivation. The symbol of candour, it has been a favourite in the Far East since early times and has been portrayed on porcelain, paintings and embroidery for centuries. It had an honoured place in palace and temple gardens and was greatly esteemed as a dwarfed plant in a pot, a specimen of full flower 'presented to the Emperor, is thought a handsome present, even from the governor of a province'.

Rumours of the beautiful Lily Tree reached Europe before the plant itself came into the hands of Sir Joseph Banks at Kew in 1780 (not 1789), but its home in the moist forests of central China remained unknown until E. H. Wilson came across it at the beginning of the present century. He found it a 50-foot tree with a girth of 6-8 feet, but under cultivation it grows to the height of a small apple tree. It may be that long centuries of cultivation and propagation by graft and layer have produced a race of smaller specimens, specimens that will flower profusely when only a few feet high.

One of the memorable sights of the spring is a Yulan gleaming in the pale sunshine like 'a naked walnut tree with a Lily at the end of every branch', as an observant Frenchman described it nearly 200 years ago. Until the appearance of the *soulangeana* clan the Yulan stood in a category of its own among flowering shrubs. One cannot but regret that those plebian flowers should have usurped the place of their patrician parent, so that the fabled Lily Tree is now regarded as little more than just another white magnolia. I think it deserves more attention on account of the striking effect of its winter buds with their coating of shaggy grey hair.

M. liliflora.

This is a very different plant. A spreading bush of 10-12 feet tall and ultimately even more across, it isn't suitable for the small garden because of its ability to shoulder everything else out of the way, not by the use of long straggling branches as might be expected, but by sending up an ever increasing thicket of upright branches. The characteristic buds, narrow and somewhat sickle-shaped, open to display scentless blooms of an unusual dark rosy purple, paler on the inside. Unfortunately individuals vary greatly in their size and colour as well as in their earliness and you cannot depend on a show

of flowers on the bare branches, that is such a pleasing feature of the Yulan, because the young leaves follow on too closely.

M. liliflora seems to have arrived in Britain via Thunberg in Sweden and from the start was thought to be hardier than the Yulan. Both were slow starters as garden favourites and their offspring, the vigorous and accommodating *M. soulangeana*, soon became better known. Thus we find that a specimen of *M. liliflora* sent home by J. G. Veitch in 1861 became known as *M. soulangeana* var. *nigra* and this form may still be found under that name in some nursery catalogues. This must be regarded as a Chinese plant, common in cultivation, but rare in the wild. Wilson saw but one specimen growing in a thicket by the wayside where it might have been a garden escape and Forrest found it only once, in 1910, growing as a 6-12 feet shrub at an altitude of over 6000 feet in the Tien-chen-pu valley.

Distinct although these two species are, they have been the sport of taxonomists for centuries, ever since Kaempfer referred to them both under the Japanese name 'Mokkwuren' in 1712. I have found no fewer than 11 synonyms for *M. denudata* and 15 for *M. liliflora*. A comparison shows that both have been known as *M. denudata* and *M. obovata* at one time or another. The trouble began in 1791 when Sir Joseph Banks published three drawings of Kaempfer's magnolias and during the process the plates of the fragrant white Yulan and the rosy purple *M. liliflora* were interchanged. So it came about that, when later that same year, Desrousseaux named and described the two, he was misled into thinking the coloured one was the fabled Lily Tree and called it *M. liliflora* and the white one *M. denudata*.

The Soulangeana Clan

Magnolia soulangeana is a clone. All the specimens, everywhere are derived from a chance seedling that flowered in the Chevalier Etienne Soulange-Bodin's garden at Fromont near Paris in 1826. It is too well known to need description but I think we might digress for a moment to consider the man whose name it has brought into everyday use.

He is first heard of as tutor to the children of a certain Mdme. Beauharnais, in Paris at the beginning of the French Revolution. Madame nearly lost her head but survived to marry an up-and-coming young man called Buonaparte, and the tutor was a witness of the marriage. The new husband didn't like him but M. Soulange-Bodin was a great favourite with Josephine, and is said to have been the one who fanned her natural interest in flowers into a love of gardens and things botanical. When the Buonapartes bought a small country house, Malmaison, the erst-while tutor had charge of the grounds and turned them into one of the greatest gardens in Europe. He retired to his villa of Fromont, on the Seine, after the fall of Napoleon, and, as 'a skilful cultivator, a seedsman, a scholar and an accomplished gentleman', turned his 100 acres into an exotic nursery and institution for training young horticulturists.

The seedling magnolia couldn't have fallen into better hands. Many seedlings were raised from it and many of them were named. The two most striking ones are *M.* 'Lennei', which appeared in Lombardy, was taken to Germany in 1880 and named in honour of the palace gardener at Berlin, and *M.* 'Rustica Rubra' which was selected from a batch of *lennei* seedlings in a Dutch nursery. Both have handsome cup-shaped flowers, rosy purple on the outside and white within, and are rather similar, although *M.* 'Rustica Rubra' lacks something of the beauty of its parent. As for the others 'Amabilis', 'Speciosa' and all the rest, I think we can borrow Farrer's expression, 'anyone interested can cater for his desires in catalogues'.

Cultivation.

This group of magnolias is of inestimable value to the garden planner. The old painters join with the modern flower arrangers in showing us that any grouping of flowers or colours is usually improved if one flower or colour dominates the whole composition: the same thing happens in garden making. Thus the *sulangeana* magnolias, planted singly or in groups, can be used to dominate the garden scene, draw together the other shrubs and undergrowth into a composite background, and thereby give cohesion to the whole design. Fortunately they are not at all difficult to grow although they don't like cold winds. They flourish in almost any soil but are at their best under the same conditions as the deciduous azaleas. They are very fond of sawdust — old brown, well-rotted sawdust, not the fresh stuff — and it is almost impossible to give them too much of it. Old plants that are not flourishing will leap out of their skins if given a foot-deep mulching, liberally fortified with blood and bone manure, out to at least 6 feet from the main stem.

Transplanting is no problem, but is better done in the early spring because the thick fleshy roots are easily bruised and tend to die back badly if they have to lie all through a cold, wet winter in a chilly soil. The tips of long branches root without any trouble if deep sawdust is used instead of soil. Layered plants tend to be unshapely and should be tied firmly into position with a firm stake and pruned hard back if necessary. As a general rule no pruning is necessary.

Old specimens of *M.* *liliflora* that are taking up too much room, or those of the other kinds that have several main stems can be cut into two with a crosscut saw, even if 6 or more feet high. Root prune the piece you are going to cut away, a year ahead, allowing a good ball of roots for the part to be severed. When the time comes move enough soil to allow the saw to work without disturbing the remaining part, which should be staked if necessary and shaped by cutting hard back. It will soon break away. The severed part should be planted with plenty of sawdust mixed with the soil, staked firmly, and then cut back to give as shapely a plant as possible. The two halves may need watering in a dry summer, but within a year or two you should have two fine specimens instead of one.

CONTROL OF PLANT VIRUS DISEASES

By P. R. FRY,

*Plant Diseases Division, Department of Scientific
and Industrial Research, Auckland.*

Plant virus disease control may be defined as the prevention of spread of the virus concerned into, or within, a particular crop. The method adopted to prevent entry or spread of infection depends on the properties of the virus involved. A virus with a restricted host range, and normally only transmitted by budding or grafting, such as apple mosaic virus, can be controlled by the use of virus free propagating material. With insect transmitted viruses that have a wide host range or a widely grown host, the probability of infection entering a susceptible crop is high and control correspondingly difficult. When devising control measures, therefore, it is important to know the method or methods by which the virus may be transmitted from plant to plant.

Methods of Transmission

1. By seed: Although viruses usually infect every cell of a plant except those of the meristem, only few are carried within the true seed. In New Zealand the only viruses known to be carried within the true seed are those causing lettuce mosaic, bean mosaic, and yellow-leaf of *Phormium*. The highly infectious tobacco mosaic virus, present in the seed coat of uncleaned tomato seed contaminates the seedling leaves.

2. By budding, grafting and vegetative propagation: Because viruses are usually present in all organs of infected plants, buds, scion material, cuttings, runners, bulbs, corms or tubers, taken from diseased plants give rise to infected progeny.

3. Insect transmission: Transmission by insects is the natural method of spread for many plant viruses. There are two types of insect transmitted viruses, those that persist for long periods in their vectors and those that persist for short periods only. Vectors of persistent viruses require relatively long feeding periods before becoming infectious and remain infectious for a considerable time, often for the remainder of their lives. Some are known to multiply in their vectors. To the persistent group belong spotted wilt, potato leafroll, pea leafroll and barley yellow dwarf viruses. Vectors of non-persistent viruses acquire infectivity after brief periods of feeding, often only a few seconds, but only retain the ability to transmit infection for short periods. Lettuce mosaic virus for instance is lost by its aphid vectors after thirty minutes.

4. Sap transmission: Introduction of infective sap into small wounds on leaves, stems or roots is sufficient to transmit many viruses. Sap inoculation is the natural means of spread of some

viruses including potato virus X and tobacco mosaic virus. These may be transmitted through injuries caused by leaves rubbing together in the wind or by transfer of infectious sap on workers' hands, clothing or implements.

5. Soil transmission: Some viruses gain entry through roots from contaminated soil. Tobacco mosaic infection may enter through damaged roots. Fan leaf of grapevines is transmitted into the roots by a nematode and big vein of lettuce and tobacco necrosis virus infections appear to be associated with root infection by a fungus parasite.

Control Measures

From our knowledge of the methods of transmission and host range of a plant virus it is often possible to recommend control measures that can be used with a high probability of success.

1. VIRUS FREE PLANTING MATERIAL

(a.) Seed: Although only a few viruses are known to be seed transmitted, this method of infection is very important for these few. Infection is introduced into the crop at a very early stage and under favourable conditions may spread rapidly throughout the crop. It is therefore important to use only virus free seed for these crops. Virus free lettuce seed is commercially produced in the United States by growing seed crops in complete isolation from sources of lettuce mosaic infection. In Australia lettuce seed is grown in an area in which the aphid vectors of lettuce mosaic do not occur. While it is difficult to raise a crop of tomatoes without tobacco mosaic virus gaining entry the virus present in the gelatinous seed coat and the testa is effectively eliminated by acid extraction.

(b.) Seed certification: Certification of potato seed has been in operation in New Zealand since 1928. Under this scheme only seed crops with less than a very low percentage of visible infection with virus or other diseases are passed for certification. While the scheme does not ensure freedom from potato virus X among several varieties which are tolerant to infection and show no obvious leaf symptoms it has resulted in a very low incidence of the aphid transmitted viruses leafroll and potato virus Y.

(c.) Vegetative stocks: With vegetatively propagated plants, the material used must be obtained from virus free parent plants. In general it is advisable or even necessary to establish nurseries of healthy parent stock in isolation from sources of infection. In some crops, however, certain varieties have become universally infected so that special measures have had to be devised to produce healthy stock.

Eradication of some viruses from vegetatively reproduced stocks has been accomplished by heat therapy. Infected plants are grown at 98° to 100°F for from one to five weeks, depending on the type of plant and the virus involved. Experiments in Auckland have resulted

in the production of apple mosaic free stocks of the main varieties of apples, many of which appeared to be universally infected. Mosaic free budwood trees have been supplied to the Fruitgrowers Federation nursery for further propagation. The technique is also being used to produce virus free stocks of certain strawberry varieties at the Horticulture Research Station, Levin.

Many *Dahlia* varieties and collections have become infected with spotted wilt virus and although not always showing disease symptoms themselves, may act as sources of infection for other garden or crop plants. The virus is carried over in the tubers to infect new shoots the following season. It has been found however, that migration of this virus from tuber to shoot does not always occur early in the growth of the shoot. It is often possible, therefore, to obtain spotted wilt-free dahlias from infected tubers by taking cuttings at an early stage and establishing them as individual plants.

The 'Aucklander Short Top' variety of potatoes was once universally infected with both potato viruses X and Y but may now be obtained free from the latter virus. In this instance, virus Y-free lines were obtained by propagating from cuttings taken from the growing points which were not yet invaded by virus Y.

Even though it is possible to establish most crops with virus free planting material, measures must be devised to prevent subsequent entry of infection into the crop or its spread within the crop. The following measures may be adopted to reduce the probability of both virus entry and virus spread within a crop.

2. IMMUNE AND RESISTANT VARIETIES

In several crops sources of resistance or immunity have been found and in some cases have been bred into now standard varieties. Immune varieties are those which cannot be infected with a particular virus while resistant varieties are difficult to infect, and if infected, usually show a degree of tolerance to the infection. Examples of immunity are found in pea varieties among which 'William Massey', 'Onward' and 'Perfection' are immune from infection while 'Greenfeast' and 'Victory Freezer' are susceptible to pea mosaic virus. A breeding programme now in progress at Crop Research Division, Lincoln, will shortly result in the production of a mosaic immune 'Greenfeast'.

Among Swede varieties, 'Sensation', 'Wye', 'Calder', are resistant to infection with both turnip and cauliflower mosaic viruses while 'Grandmaster' and 'Superlative' are susceptible to both. The Wheat variety 'Aotea' has a degree of resistance to barley yellow dwarf virus.

3. DESTRUCTION OF ALTERNATIVE HOSTS

Viruses that have a wide host range or a widely grown host may enter crops from adjacent weeds, nearby crops, or from pastures. Thus Capeweed, *Nasturtium*, or *Dahlia* plants infected with spotted wilt virus may be a source of infection for susceptible crops such as

tomato, lettuce, pea or Iceland poppy. Red clover plants in pastures, roadside or headlands are commonly infected with pea mosaic virus and often act as sources of infection for adjacent pea crops. Many of our common weeds are hosts of at least one virus and also often support colonies of insect vectors. Clean cultivation and removal of weeds from headlands often assists in reducing the incidence of virus diseases.

4. ISOLATION OF CROPS

Where a crop can be isolated from sources of infection either by growing in areas free from hosts of a virus, or by growing in areas where virus vectors do not occur, good control can be achieved. Strawberry nurseries established with virus free plants in districts remote from normal production areas remain virus free for long periods. Potatoes grown for certified seed production are most successful in districts where the aphid population is low.

5. ROGUING

If a few plants become infected at an early stage of growth they will act as a source of infection for the remainder of the crop. It is therefore necessary to inspect such crops as lettuce, pea, cabbage, cauliflower, tomato and tobacco frequently during the early stages of growth and remove and destroy any plants showing virus symptoms. If incidence of virus is high then active spread is probably already in progress and roguing will be of little value.

6. CONTROL OF INSECT VECTORS

The usefulness of control measures directed against insect vectors depends on the type of crop and the relation of virus to insect vector. Infection is usually introduced into a crop by insects from alternative hosts in the vicinity. Contact insecticides, while reducing the number of insects within a crop do not prevent further insects from entering soon after spraying. Systemic insecticides are more effective in preventing the establishment of insect populations within a crop but still do not prevent the attempted entry of insects from outside. Non-persistent viruses which are transmitted by their vectors after very short feeding periods can be introduced into the crop before the vectors are killed by the systemic insecticide. Persistent viruses on the other hand generally require vectors to feed for extended periods before infection occurs. With this type of virus it is more likely that the vectors will be killed by the systemic insecticide before transmission has occurred. A measure of control of the persistent virus pea leafroll in pea and broadbean and barley yellow dwarf in 'Aotea' wheat has been achieved by the use of systemic insecticides. In the case of 'Aotea' the control appears to be assisted by the resistance of this wheat, as no control was obtained in highly susceptible varieties of oats and barley.

7. HYGIENE AND SANITATION

Highly infectious sap transmissible viruses such as tobacco mosaic and potato virus X are carried from infected to healthy plants by

workers' hands, clothing and implements. Infection may be removed from hands and clothing by thorough washing with soapy water, and from implements by washing or by burning with alcohol. Roots of infected plants and plant debris left on the soil surface serve to carry virus over between crops. Strict hygiene must be practised with such crops as tomato which is susceptible to both of these viruses. All roots and plant debris must be removed especially in glasshouses where the soil is not exposed to natural weathering.

Carry over between crops may also occur from stray plants that have not been harvested. In onion crops a few yellow-dwarf infected bulbs remaining in the ground will provide a source from which aphids can spread infection.

From the above description of methods of transmission of plant viruses and measures suggested for their control it is clear that there is no universal panacea for virus diseases. Worthwhile control of most, however, may be achieved by careful attention to the measures suggested. Virus free seed or planting stock should be used to establish crops. Subsequent entry and spread of infection can be prevented or reduced by the use of immune or resistant varieties, isolation of crops from sources of infection or from vectors, destruction of alternative control of insect vectors in those crops for which this method applies hosts in the vicinity, removal of infected plants as soon as they appear, and by crop hygiene and sanitation.

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THE STAG'S HORN FERN

MARGUERITE CROOKES.

'What an odd looking thing. Is it an orchid?' asked a friend about the Stag's Horn Fern, fastened to a piece of wood and flourishing mightily. No, it is not an orchid though it is certainly a most queer looking creature, and like some of our more spectacular orchids comes from tropic lands and takes measures for water conservation.

The Stag's Horn Fern belongs to the genus *Platyserium* (from the Greek platys, broad and keras, a horn), a tropical genus of about twelve species, found in Africa, Madagascar, Malaysia and South America (one species). Why do these plants have such an unfern-like appearance?

It must be remembered in the first place that they are perching plants (which botanists call epiphytes); and a perching plant even though it lives in a well-watered rain forest, is liable to have drought problems. Water, indeed, falls on the tree, maybe in large quantities, but unless appropriate measures are taken, it will run down the trunk leaving the thirsty plant still insufficiently supplied. The Stag's Horn copes with this problem efficiently — water it must have, and it sees that it gets it.

If you study the fern you will see that it has leaves of two very different kinds, first the fertile leaves erect or drooping, which are branched after the manner of a stag's antlers, and in addition, round the base of these, broad, rounded and sometimes convex leaves, which spread over the roots and rhizome and are sometimes known as nest leaves. These basal nest leaves rarely bear spores. Sometimes they spread over the supporting branch and as they wither others will grow out and take their place. Into this mass the roots of the fern will penetrate so that the plant is able to find nourishment from its own waste products. In *Platyserium grande* the nest leaves are even more efficient. Some grow up and spread out at right angles to their support, are concave and bend slightly upwards. They thus form a convenient basket for any dead leaves etc. which may drop down from above. But nest leaves don't last forever. What happens when they wither and start to lose their toughness? Does their precious burden of plant food fall to the ground? Not a bit of it. As it ages the nest leaf bends upwards till it eventually presses against its support with its load of humus safely inside. Then as the next leaf grows over it a nice little store is available for penetration by the fern roots, and the plant develops merrily.

In *Platyserium grande* the fertile leaves grow downwards and may reach a length of 6 feet. The spore bearing part is confined to a patch at the base of the forks and if you look at one of these you will see that it is completely covered with spore containing capsules (sporangia as the botanists call them) and may be as much as

a foot across. When you consider that each sporangium contains 64 spores, and that you cannot see the sporangia without the assistance of a strong lens you will realise that the number of spores produced by a mature many-fronded plant is astronomical. While the sporangia appear to be scattered indiscriminately on the fertile under surface, microscopic examination shows them to be actually located along veins, thus ensuring for them a good supply of nourishment. Developing sporangia are delicate things and in many ferns they are protected by special structures known as indusia. But the *Polypodium* family to which *Platyserium* belongs does not favour indusia. Are then the sporangia unprotected? No, for in their early stages they are well protected by white star-shaped hairs whose branches interlock to form an efficient felted covering. Similar hairs are found on the fronds, particularly when young, giving them sometimes a characteristic grey-green appearance. The hairs on the fertile parts, however, have longer stalks thus enabling them the better to cover the capsules.

The difference between the nest leaves and the foliage leaves is in most cases striking. How did they develop? Which came first? At one time it was suggested that nest leaves were primitive and that the foliage leaves developed from them. But investigation showed that the first leaves formed by the sporeling were simple and upright with a single vein running through them but when the third leaf developed it was round or kidney-shaped and the veins were now netted. Like the leaves the hairs also develop and are no longer single-celled glandular ones but have become star-shaped. The rhizome now proceeds to bear leaves in two ranks on its upper surface and they appear as nest leaves and foliage leaves, though apparently not developing in any definite sequence.

Bower suggested that neither nest nor foliage leaves are primitive, but that both developed from an original type of leaf 'which may not have been quite like either of them.' It should be noted in this connection that the nest leaves are not invariably infertile and that sporangia have been reported from them. It is of interest that if the plant is grown in a dimly lighted room, foliage leaves alone will develop.

Is there much difference between the species of Stag's Horn? Less than with some fern genera. *Platyserium stemaria* Beauv. an African fern (once known as *P. aethiopicum*) is unusual in that it has wedge-shaped, not horned, foliage leaves. Other species differ as regards the form of the fronds and the way the fertile patches are arranged. In some species there is a special fertile lobe and the spores are not found on the horns at all. This happens in *P. coronarium* (Koenig) Deasv. (previously known as *P. bifforme* Bl.). At first the frond forks unequally produce a number of shortish horns. Then there is developed a disc-shaped convex lobe bearing the spores. Paired with this, however, and giving the plant a very

handsome appearance is a long drooping branch which remains undivided for about 2 feet then branches into a number of 'horns'. Similar though smaller and lacking the long pendulous branch is *P. ridleyi* Christ.

A very striking Stag's Horn is *P. grande* J. Sm. This fern has beautiful long fertile fronds which may reach 6 feet. It has no fertile lobe but the fertile area forms a large patch at the basal hollow (sinus) where the frond divides.

P. wallichii Hook is similar but its fertile leaves are only about 2 feet long and the fertile area is at the base of the first two divisions. Its woolly felt is yellowish.

We are fortunate that both *P. grande* and *P. bifurcatum* (Cav.) Chr. (formerly known as *P. alvicorne* Desv.) grow outside. *P. grande* however can only be propagated by spores. The fine *P. bifurcatum* is a hardy specimen, and appears to be able to sustain quite a bit of unusual treatment as regards food. Its fertile area is confined to the ends of the horns extending up to and sometimes across the division. While it does well on a tree trunk or block of wood, it also makes an excellent basket fern, since the roots will burrow in all directions and produce root buds. Thus new plants will be produced all over the basket with very decorative results.

Other species appear to require hot-house treatment. All species as well as *P. grande* can of course be propagated by spores and these germinate readily.

Both for their charm and interest then, Stag's Horns make an agreeable addition to garden or hot-house.

PLANT RAISERS' AWARD

The object of this Award is to encourage plant breeding in New Zealand and the award is granted to any nominated individual who has raised in New Zealand a plant considered sufficiently meritorious.

The members of the Plant Raisers' Award Committee are:

Mrs A. J. DuPont, Messrs E. Hutt, V. C. Davies, K. J. Lemmon,
and J. P. Salinger. The Chairman is Mr A. M. W. Grieg.

This Committee met on 10 July 1963 to consider nominations which had been submitted for the Plant Raisers' Award of the Royal New Zealand Institute of Horticulture. Of the three nominations two were successful:

- (1) The late Dr. Rodney Francis of Hastings, nominated by the Wellington Rose Society, in respect of the new variety of Rose (floribunda) named 'Cresset'.
- (2) Dr. J. S. Yeates of Palmerston North, nominated by the Wellington District Council of the Royal New Zealand Institute of Horticulture, in respect of *Lilium parkmannii* hybrids, and in particular the variety 'Excelsior'.
- (1) THE LATE DR. RODNEY FRANCIS — ROSE (FLORIBUNDA) 'CRESSET'.

The New Zealand rating of this rose was compared with other well known varieties; details being:

'Cresset' — 22 reports (16 North Island, 6 South Island) over three years Rating 8.8

By comparison with

'Korona'	130 reports over 4 years	Rating 9.1
'Titian'	48 reports over 4 years	Rating 8.9
'Iceberg'	75 reports over 4 years	Rating 8.9
'All Gold'	reports over 4 years	Rating 8.5
'Queen Elizabeth'	reports over 4 years	Rating 7.6

Registered 28/10/60, No. 173, *Australian/N.Z. Rose Annual*
Parents:—'Cocorico'. 'Queen Elizabeth'.

(2) DR. J. S. YEATES—*LILIUM PARKMANNII* HYBRID 'EXCELSIOR'.

Description:—'Excelsior' Cl. (*auratum* var. *platyphyllum* x 'Jillian Wallace') (Yeates 1952): Yeates/Harrison catalogue (1956): China Rose (H.C.C. 024/1) with narrow white margin and segment tips; *auratum* type; sometimes called *parkmannii* 'Excelsior' P.C. (R.H.S.), 12 August 1958.

These nominations were recommended to Dominion Council which then approved that the Plant Raisers' Award be made to the late Dr. Rodney Francis for the raising of the new variety of rose (*Floribunda*) 'Cresset' and Dr. J. S. Yeates for the raising of the new variety of lily *Lilium parkmannii* 'Excelsior'.

Dominion Council approved that inscribed bronze medals be presented to the successful nominees and also recommended that adequate publicity be given to these awards each year.

NOTES FROM THE CHRISTCHURCH BOTANIC GARDENS

L. J. METCALF, N.D.H. (N.Z.), (*Assistant Curator.*)

Following the unpleasant winter, or rather it might be more correct to say that the winter continued almost till the end of September, there was little improvement in the general conditions until October. However, this season spring really came with a rush, and the displays of spring flowering plants were easily the best for many years. Both August and September were cold sunless months, with sunshine well below average and September, without appearing to be so, was actually drier than average. In October the weather improved remarkably and tried to make amends for the lack of sunshine by producing some really beautiful days. On the whole conditions for this month were rather dry and tended to resemble those of November. However, they have been ideal for the flowering trees, shrubs and other plants grown in the gardens.

During the spring months many flowering trees and shrubs delight the eye in the Botanic Gardens and without any doubt one of the most useful and outstanding groups of flowering trees is the crab apple or *Malus*. Of the flowering trees, the best of the *Malus* are amongst the most beautiful, while some are particularly valuable for their displays of fruit and, with one or two, the foliage is also quite effective.

In Christchurch flowering commences at the beginning of September and one or two of the species take the season on into November.

The genus *Malus* consists of about 30 species and numerous hybrids and cultivars. Few of the species are now grown in gardens, the many excellent hybrids having superseded them. However, one or two of the species deserve to be more widely grown.

The first to open its flowers is *Malus halliana* and, although its flowering season is from mid-September till the beginning of October, it can nearly always be relied upon to open one or two of its rose-coloured flowers at the beginning of September. It is a native of Western Szechuen, China and, being a comparatively small growing species, is ideal for home gardens. The double-flowered *M. halliana* 'Parkmanii' is claimed by some to be even more beautiful. Next in order of flowering is *M. floribunda* which flowers from mid-September till mid-October and also has one of the longest flowering periods of the *Malus*. This spring the trees in the Gardens were truly magnificent, every square inch being covered in blossom. In flower it must rank as one of the most beautiful of the crabs. The flower buds are coloured a rich rose, while the flowers open to a pale pink and ultimately white, and is seen at its best when about half of the flowers are open. It was introduced into cultivation from Japan, but is unknown in the wild there and is generally regarded as a hybrid.

Malus pumila var. *niedzwetzkyana* is important because it has had a very strong influence on some of the hybrids which follow, its rich purplish colour having been imparted to them. It is a small tree with very much the character of an ordinary apple but the whole tree, flowers, foliage, fruit and even young wood, is completely permeated with a reddish-purple coloration. Of its progeny, *M. x purpurea* and *M. x purpurea* 'Eleyi' are well enough known in this country but less so is the superior *M. 'Lemoinei'*. These flower from late September till mid-October. *M. 'Lemoinei'* has somewhat larger and brighter flowers. More recently introduced into this country is *M. 'Oporto'* which is another hybrid of this group. It has the largest flowers of all, and a specimen of it coming into flower is suggestive of the colour of a rich ruby port wine. Also it has a slightly longer flowering season than *M. 'Lemoinei'*.

Early October brings *M. x arnoldiana*, *M. 'Robert Nairn'*, and *M. 'Sir Heaton Rhodes'* into flower. *Malus x arnoldiana* originated in the Arnold Arboretum, U.S.A., as a seedling from *M. floribunda* and it very much resembles a larger flowered form of that plant. The large flowers and graceful habit make it an outstanding plant during October while its fruit are not unattractive in the autumn. 'Robert Nairn' both for flower and fruit ranks with the best, and it does not have the ungainly habit which characterises one or two other cultivars. 'Sir Heaton Rhodes' is an old favourite which improves with age. However, it has been eclipsed by varieties such as 'Lemoinei' and 'Oporto'.

One species which is usually much admired by visitors is *M. sargentii*, a low bushy plant seldom exceeding 8-10 feet in height. It has pure white flowers and the fruits are bright red. The flowering season is from mid till late October and the flowers are borne in great profusion. The small size and attractive habit of this tree makes it an ideal plant for the home garden, and it is a pity that it is not seen more.

Malus 'John Downie' is one of the older and in some ways still one of the best of the crabs grown for their fruit. It is one of the parents of 'Jack Humm' but has a far more graceful habit of growth. 'Jack Humm', while it may be regarded as one of the finest fruiting crabs, has a very stiff and ungainly habit of growth which detracts from what would otherwise be a very fine garden plant. There are some other cultivars which are grown for their fruits, but as yet they are not represented in the Botanic Gardens collection and so no comment can be made concerning them.

One of the latest flowering of the species is *M. toringoides*, a species from Western China with distinctively lobed leaves, and white flowers. It has a rather loose habit of growth and in the late summer and early autumn produces a fine display of small yellow and red fruits. The last species to flower here in the Gardens is *M. ioensis*, the prairie crab, a native of the middle west of the U.S.A. It forms a small tree up to 30 feet in height and the specimens in cultivation here have somewhat deflexed, sweeping branches which give it a most attractive appearance. The flowers are rose-pink, about 1½ inches across and the flowering season extends from mid-October well into November. The double-flowered Bechtel's crab, *M. ioensis* 'Plena', has most attractive flowers about 2 inches across, but it has a rather awkward habit of growth and cannot compare with the grace of the species.

With their greatly varying character, beautiful blossoms over a long season and in some cases attractive autumn fruits, the *Malus* or crabs can lay claim to being one of the most useful groups of trees and shrubs in the garden. Certainly those who know Christchurch and in particular the Botanic Gardens in the spring will fully endorse this statement.

DAMAGE TO FLOWER SEEDS CAUSED BY DUSTING WITH THIRAM

JOHN D. ALLEN, *Botany Department, University of Canterbury.*

Thiram* is undoubtedly one of the most effective fungicides available for seed treatment. It is active against a wide range of fungi, is not poisonous to the user, and has not been reported as causing

*Thiram (tetramethyl thiuram disulphide) is sold under various proprietary trade names.

damage to seed or seedlings. As a result it is widely used throughout the world on crop seeds such as peas and maize and on vegetable and flower seeds generally. This report shows however that the germination of certain flower seeds is adversely affected, and that in the case of nemesias treatment may result in a proportion of the seedlings showing malformation of the leaves known as 'funnel leaf'. The condition is characterised by the fusion of the first pair of true leaves into a single funnel-shaped or cup-shaped leaf, and by the suppression of the apical growing point (see fig. 1). A similar malformation sometimes occurs in fathen (*Chenopodium album*) affected by 2,4-D hormone damage.

Nemesia seedlings affected by funnel leaf were first noted by a Christchurch grower three years ago when up to 50 per cent of the plants in some of his boxes were affected. The seed had been treated with a thiram dust for disease control. The same trouble appeared again more recently in another property, and the grower concerned suspected that a seed dust containing 80 per cent thiram was responsible. Fortunately he had not treated all his nemesia seed so samples of dusted and undusted seed were available for testing.

The possibility of 2,4-D being responsible for the damage was not overlooked, and a trial was carried out to compare the performance of the grower's treated seed, his untreated seed, and a portion of the latter which had been exposed to 2,4-D for several hours. When the seedlings emerged, there was no apparent difference between the untreated and 2,4-D treated samples. In the case of the thiram treatment however there was a reduction in germination of 38 per cent; some seedlings had died after emergence and 18 per cent showed symptoms of funnel leaf. All were stunted in comparison with the other two samples.

This seemed conclusive evidence that the thiram dust was not only responsible for the funnel leaf condition but was also capable of bringing about a considerable reduction in germination. As this was the only known case in which thiram had proved deleterious to seed, a second trial was laid down using a different proprietary brand of thiram dust. This was applied to nemesia seed at four different rates, and was compared with undusted seed and with seed dusted with another fungicide:—captan (Orthocide). The results of this trial are shown below.

TREATMENT	EMERGENCE Per Cent
no treatment	70
captan: excess	69
*thiram: 1% w/w	38
thiram: 2% w/w	25
thiram: 5% w/w	17
thiram: excess	7

*proprietary dust containing 50% thiram.

In this trial no funnel leaf developed and stunting of the thiram treated plants was not so obvious as in the first trial. The reduction in germination was very marked however and the degree of reduction was correlated with the rate of thiram applied to the seed.

There seems no doubt, therefore, that thiram can seriously impair the germination of *Nemesia* seed and induce the funnel leaf condition in *Nemesia* seedlings. The absence of funnel leaf in the second trial does indicate, however, that this effect may arise only under certain undetermined environmental conditions.

Preliminary work with other flower seeds indicates that thiram damage is not confined to nemesias. The species tested so far fall into four classes according to their reaction to excess thiram.

1. *Nemesia*, *Phlox drummondii* (see fig. 2), *Petunia*, French Marigold, *Celosia plumosa*: these all show a marked suppression of germination and stunting of the seedlings.
2. *Salvia*, African Marigold: these are stunted but germination does not appear to be affected.
3. Carnation, *Lobelia*: these are slower to emerge but the final germination is not affected.
4. Wallflower, *Zinnia*, China Aster, Perennial Aster: these are not affected, and may benefit from treatment.

Although this work is still in the experimental stage, enough has been done to show that many flower seeds can be damaged by treatment with fungicides containing thiram. Alternative fungicides such as captan should therefore be used on flower seeds (particularly those in group 1 above) whenever it is necessary to protect them against seed rot and damping-off.

NOTES FROM DUNEDIN

R. W. BALCH, N.D.H. (N.Z.) (Assistant Superintendent of Reserves.)

Most growers of rhododendrons in New Zealand agree that Dunedin has one of the most favourable climates in the country for the successful cultivation and flowering of this fine race of plants. The type of soil, comparatively mild weather, without extremes of heat or cold, and the even distribution throughout the year of a moderate rainfall, all combine to give suitable conditions for healthy growth, free flowering and freedom from attacks by those pests and diseases that can be troublesome in other parts of the country. The large and spectacular plants of species such as *R. arboreum*, *R. delavayi*, *R. maddenii*, *R. thomsonii* and *R. falconeri*, and of the older hybrids, 'Cynthia', 'Pink Pearl', 'Marquis of Lothian', 'Fragrantissimum', and 'Cornubia', seen in the older private and public gardens in and around the city, prove they have been popular shrubs here for very many years.

In recent years, with the modern hybrids being more readily obtainable from New Zealand nurserymen, they are being used in ever increasing numbers for colour in home gardens, and for shrub plantings in landscape and garden design generally. The large private woodland garden at 'Glenfalloch' on the Otago Peninsula displays some of the finest rhododendrons in the country. The extensive plantings in the Dunedin Botanic Gardens help to show the wide range of material available. The steadily increasing use of rhododendrons, including deciduous and evergreen azaleas, in streets and reserves around the city keep them before the public eye in the flowering season. Many private gardens in Dunedin owned by lovers of these plants show the excellent effects that can be obtained by their thoughtful use in garden design. An inexhaustible range of form, habit, foliage, colour — together with pleasing scent and attractive young growth, particularly among the species — make them ideal subjects for carefully planned areas. A large number of woodland plants — primulas, meconopsis, lilies, anemones, erythroniums, astilbes, foxgloves and many more — which delight in similar conditions, associate happily in their company, while the ease of maintenance of such a garden, compared with most other types, is always an advantage.

Providing the essential, though simple requirements for the successful cultivation of rhododendrons are understood and provided, it is astonishing to discover the variety of situations under which they will thrive in a climate like Dunedin. The harsh conditions encountered in the medial strips and traffic islands of modern roads and motorways, sunny banks, cool shady gullies, in woodland areas — these all vary greatly from the more ideal settings, with the shelter and good attention, found in many gardens. These essential requirements are a cool moist root run, shallow planting, a non-alkaline soil, protection of surface roots in summer, and freedom from competitive root systems of older and larger trees and shrubs. Some particular species and varieties do of course have more specific requirements in regard to the amount of shade, protection from wind or frost, and in the texture of the soil. *Rhododendron* species are found growing naturally in many regions of the world, ranging from within the Arctic Circle to the monsoon forests of the Far East and the alpine meadows and cliffs of many lands. A number of species are always found as epiphytes, growing perched on the branches of large trees, existing on the humus and decaying vegetable matter found in the forks and crevices of their trunks and limbs. Consequently, to know the natural habitat of the plants we wish to grow enables us to provide just that little extra care to ensure success.

Rhododendrons have a dense fibrous root system so that transplanting is usually very easy. In fact, with care they can be moved at times other than the normal planting season, a liberty most shrubs growing in the open ground will not tolerate. It is essential, however, that they be planted at the same depth as in their previous

positions. On account of the surface rooting system, they dislike intensely being put in, even an inch or two deeper. Neglect of this fact is one of the commonest causes of ill-health. A cool moist root run is always necessary, but over-wet feet is just as injurious. A neutral non-alkaline soil, rather than an acid soil, provides a good growing medium. Observation leads me to believe that these plants are more tolerant in this respect than is often thought, but a soil that has been limed should be avoided; this applies also to areas on which bonfires have been lit. Mulching of some kind or other is most necessary as a protection for the surface root system from the heat of summer and to conserve moisture. This should always be applied before the soil dries out, and may be spread several inches in depth around the plants above the surface. Well rotted sawdust, pine needles from a forest floor, cocoa bean husks, well rotted compost, leaf mould and lawn and grass clippings in thin and frequent applications, are all excellent materials to use.

It is often written that rhododendrons need partial shade, and so should be planted near or under trees. Unless done with discretion, this results in more losses, lack of vigour and ill health than by any other factor. If particular rhododendrons produce poor growth and the foliage browns around the edges, nine times out of ten this can be the reason. It is simply the result of thirst and starvation. Established trees and large shrubs often have extensive root systems which include surface as well as tap roots. In summer, and periods of little rain, they absorb any available surface moisture, to the deriment of smaller plants growing in the vicinity, unless frequent artificial watering is done. When the shelter and shade of trees is necessary or rhododendron plantings, those with deep rooting systems only should be used. The rhododendrons should be planted beyond the range of those roots. If this is not entirely possible, the frequent cutting of encroaching roots by digging round the rhododendrons just beyond the limit of their own roots will assist growth if accompanied by frequent feeding, watering and mulching.

Reports from more northern areas indicate that a somewhat disappointing flowering season was experienced this year, accompanied by severe attacks by thrips. In Dunedin, however, in spite of a series of later and heavier frosts than normal, a delightful rhododendron season has been enjoyed, with much of interest, from August to December. Azaleas, both deciduous and evergreen, have been a mass of bloom, while the main display of rhododendrons has been as spectacular as ever. As the range of good species planted is steadily increasing, their worth and charm are becoming ever more apparent. Among the outstanding ones for bloom this season were *R. falconeri*, *R. chasmanthum*, *R. lutescens*, *R. arboreum*, *R. kingianum*, *R. delavayi*, *R. elliottii*, *R. burmanicum*, *R. maddenii*, *R. orbiculare*. The Ilam raised hybrids, *R.* 'Scarlet King', 'Red Glow', 'Ilam Violet', 'Assamicum Hybrid', 'Loderi Irene Stead', have been particularly free flowering. Although

many choice dwarf species and varieties have been raised in the Botanic Gardens nursery it is very difficult to display them to the public owing to the constant losses by theft of the smaller plants. By careful siting of future plantings, it is hoped to solve this problem to a large extent. How to prevent children from stripping the large ornamental leaves from *R. sinogrande*, *R. macabeanum* and *R. magnificum*, is another problem.

A NOTE ON THE PRE-TREATMENT OF KOWHAI (*SOPHORA MICROPHYLLA* AIT.) SEED

By D. S. PREEST.

Exposure to relatively high temperature for short periods of time has often been found to stimulate germination of certain seeds that are otherwise very slow to germinate. This phenomenon has been observed in connection with forest and scrub fires (2, 4, 5, 6), and also occurs when the seeds of some species are dipped or soaked in hot or boiling water (1, 3, 4, 7).

The seeds of kowhai (*Sophora microphylla* Ait.), a popular New Zealand ornamental tree, like those of some other *Leguminosae*, are naturally slow and irregular in their germination. It is popularly believed that placing the seed in freshly boiled water and allowing it to soak until the water has cooled to air temperature will induce mass germination. To test the value of this treatment and also that of moist, cool pre-treatment, both with and without the hotwater treatment, seed collected from Papatowhai Inlet, Southland, was treated as shown in the accompanying table. The resultant germination percentages are also shown.

The seed used was 100% sound. Lots 1 and 2 (see table) were soaked in water at room temperature for 24 hours immediately before moist, cool pre-treatment. Lot 3 was soaked in the same way immediately before sowing, and lot 4 was sown without soaking. The hot-water treatment (lots 1 and 3) consisted in placing the dry seed in approximately 250ml (0.44 pts) of water which had just been boiled, and allowing it to cool to air temperature. In moist, cool-pre-treatment the soaked seed was stored at 5°C (41°F) in calico bags over water in a container with a loose-fitting lid. All lots — 400 seeds each — were sown on 4 November, 1958 in nursery flats in the glasshouse, where they remained for 12 months and were then placed outdoors beneath a slatted shade frame, allowing the entry of approximately 40% full sunlight, for the remaining period. They were watered regularly in the glasshouse and from time to time during dry periods when placed outdoors.

The germination results (see table) indicate that:

1. The hot-water treatment, as carried out in this experiment, is lethal to kowhai seed.
2. Moist pre-treatment for 75 days at 5°C by itself effects a considerable improvement in first- and second-year, and in total germination, compared with that of untreated seed. But it does not induce even mass germination immediately after sowing.

The failure of the hot-water treatment may have been due to the use of too large a proportion of hot water to seed, resulting in the maintenance of high temperature for too long a period. The use of a smaller quantity of water in each case, or dipping the seed in boiling water momentarily, or for a few seconds only, may achieve the desired result.

TABLE OF TREATMENTS AND GERMINATION PERCENTAGES.

1958 18 Feb.	TREATMENTS Seed Collected			
	Stored dry at 5°C			
21 Aug.	Lot 1 400 seeds Hot-water treatment Cold-water soaking	Lot 2 400 seeds Cold-water soaking	Lot 3 400 seeds	Lot 4 400 seeds
22 Aug. to 3 Nov.	Moist pre- treatment for 75 days at 5°C	Moist pre- treatment for 75 days at 5°C	Stored dry at 5°C	Stored dry at 5°C
4 Nov.			Hot-water treatment Cold-water soaking	
	Sown*	Sown	Sown	Sown
	GERMINATION PERCENTAGES IN SUCCESSIVE YEARS.			
1958-59	0.25	8.00	0	1.75
1959-60	0.50	72.50	0	46.75
1960-61	0	3.75	0	5.75
Total	0.75	84.25	0	54.25
Sound remainder	0	3.75	0	7.25

* Nearly all seeds in this lot had decayed during moist, cool pre-treatment—only 11 appeared sound at time of sowing.

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NOTES FROM PUKEKURA PARK

A. D. JELLYMAN, N.D.H. (N.Z.), (New Plymouth.)

The native ferns of New Zealand command attention, not only because of their diversity of form, but also their wide range of habitats. The average person does not appreciate the full extent of our ferns, and it is through devoting areas and houses to their cultivation that public parks can bring together a collection of these, and give the public a chance to see them as growing plants.

Apart from the abundance of fern life in the bush at Pukekura Park, there are two houses and one outside area devoted to their cultivation. These houses were built in 1927 by excavating clay from a gorse covered hillside and filling a nearby swamp area, which now constitutes the fernery lawns and flower beds.

As you enter the fernery you go through a short underground fern tunnel clothed with mosses and ferns, until you reach the first fern house. You seem unaware of the glass roof above, because of the arresting variety of ferns before you. This, then, is the home of some 130 species of ferns, ranging from lowland to mountain forms and species. Names given are in accordance with Allan's *Flora of New Zealand* Vol. 1. 1961.

One of our proudest possessions, which over the years has grown into sizeable proportions is the *Loxoma cunninghamii*. Its location is in the northern part of the North Island. When the pale green fronds uncurl they gradually reveal their distinguishing feature. This is the cup shaped indusium which hangs on the undersides of the fronds like small buckets. Besides this unusual feature the ageing fronds colour pleasant browns, oranges and yellows.

The silver fern *Cyathea dealbata* with its trunk characterised by its persistent stipe butts is familiar to all. Less known is the Golden Tree Fern, *Dicksonia fibrosa* whose fronds hang down to protect the aerial roots that clothe the trunk. If these fronds are constantly removed an immediate decline in the health of the plant is visible. On the trunk of our fernery specimens *Phymatodes scandens* is making splendid growth among the fibrous roots of its host. There is a *Dicksonia lanata* whose trunk is usually prostrate but after many years has developed an upright trunk over 2 feet in height.

A most unusual climbing fern is the Mange-mange, *Lygodium articulatum*. It climbs by tendrils, and not by roots, as many ferns do. Besides this mechanism of support the frond midrib is greatly elongated, and on young leaves turn about their support to hold the plant up until the tendrils are capable of doing this work. To all appearances this midrib looks just like a long stem.

The *Blechnaceae* is well represented in our collection. Note-worthy among these is *Blechnum fraseri*, the miniature tree fern. There's the lesser known *Blechnum durum* with its dark green, almost black

fronds, and a bank of *Blechnum vulcanicum* distinguishable by means of its wedge shaped fronds. *Blechnum patersonii* does well covering part of a wall and is now reaching gigantic proportions. On the clay walls clumps of *Blechnum discolor* have turned upwards, and formed small trunks. This fern is most showy when it is exhibiting its fertile fronds.

The Prince of Wales Feathers, *Todea superba* was always attracting interest — some of the collection are reputed to be over 100 years old. These are growing in moist conditions near running water, and need protection from draughts of any kind, while the new fronds are in the process of unfurling. Cold draughts will result in distortion of the frond at this stage. There are several fine *Todea hymenophylloides* the intermediate form. One specimen has a spread of 7 feet — each frond measuring 3ft. 6in. in length. This is one of the most graceful of our native ferns and seems to thrive in moist conditions. In dry conditions it seems susceptible to attacks by scale insects, but this can be rectified by spraying. *Todea barbara* is a close relative to the English Royal Fern, *Osmunda regalis*, and a most handsome fern which grows into huge, eye catching, specimens. This fern unfortunately is a favourite of thrips which soon disfigure with their silvering if not detected at an early stage. Early and periodic seasonal sprayings of Malathion W.P. will give adequate control.

The *Aspleniaceae* or Spleenwort family is another that's also widely represented here. Familiar to most, the shining spleenwort *Asplenium lucidum* always looks attractive whether on the side of a tree trunk or planted in the ground. The fine leaved hen and chickens *Asplenium bulbiferum* var. *tripinnatum* grows huge fronds, some 5 feet in length. A recent addition to the collection was *A. flabellifolium* from Nelson. These plants are set in moss baskets and should really look attractive when they send down their long necklaces of fronds. Failure after failure has been the plight of growing Hooker's spleenwort *A. hookerianum* indoors so now it is being attempted outdoors in association with *A. hookerianum* var. *colensoi*. These two seem to thrive in one another's company, so we are growing them together and emulating ecological conditions trying to secure success. Perhaps the chlorinated water of the city supply is the downfall of this subject, because it most certainly is not appreciated by filmy ferns.

Hypolepis tenuifolia is one fern that commands attention, if only for its size. The form we have growing here attains a height of 6 feet under ideal conditions, and its inch thick stipes are sticky to touch before its pea green huge fronds unfurl.

On the tunnel faces *Adiantum fulvum* and *diaphanum* both grow luxuriantly. The makaka *A. aethiopicum* helps to clothe the higher and drier banks near the glass where others will not survive. Both *A. hispidulum* with its new pink umbrella fronds and *A. formosum* rely upon the tall majestic fronds to attract attention. The latter is fast becoming naturalised outdoors along shady pathways.

Thelypteris pennigera forms a caudex and one noted is over 3 feet high and has five more caudices, each 1ft. high, sprouting from its base. From the northern districts *Thelypteris dentata*, a smaller fern with a soft frond and creeping rhizome is a useful member in a collection. For filling pockets in the fernery rockery there are clumps of *Doodia media* and *D. caudata* whose reddish tinted fronds are a useful contrast to the greens.

On a vertical bank, *Gleichenia cunninghamii* stands out, particularly when the new fronds are unfurling. The Maori name is most appropriate, Tapu-wae-kotuku, the foot print of the White Heron, besides creating a distinctive group of ferns. On a dryish bank *Gleichenia flabellata* has been growing for 30 years and is still thriving but unfortunately it's attacked by scale insects and if not noticed in the early stages the fern becomes disfigured with sooty mould.

The parsley fern *Botrychium* sp. are aptly named for they certainly resemble parsley. It is unusual in that the sterile and fertile fronds form one stem. The sterile fronds tend to go unusual shades of brown when they're about to die back.

Marattia salicina, Para, or King Fern, is New Zealand's largest herbaceous fern and is growing luxuriantly in several outdoor areas of the park. In the *Ginkgo* dell at Maranui there is a fine grove some of which have 'horseshoes' up to 24 inches high looking like the trunk of a *Phoenix canariensis*. Even indoors *Marattia* will grow quite well, but never seems quite so luxuriant as those out of doors.

From the thermal districts we have *Nephrolepis cordifolia*, the fish bone fern. Its graceful fronds hang down over the entrance to the 2nd fernery house you enter. The *Lindsaea* seems difficult to grow outside its natural environments and after successive indoor disappointments *Lindsaea cuneata* and recent addition *L. linearis* are being tried in the outdoor fernery.

A fern suitable for growing in a mass basket is the *Davallia tasmanii* commonly called the hare's-foot fern. The creeping rhizomes, which are covered with fine bristles, force their way outside the basket and gradually encircle it, then later on fronds sprout from them.

Like most plants, ferns exhibit some of their most striking peculiarities in connection with their method of reproduction. A number of ferns are raised by spores dusted on to sterilised brick or broken rubble, whilst aspleniums produce bulbils and rhizomatous types are cut from the parent and divided.

The ferneries are watered both by adjustable nozzle type hose and overhead jet system. The overhead jet system is employed mostly on warmer days and during the summer to freshen the ferns. Damp sawdust on the floors helps keep temperatures down when the sun is hottest but additional shading is necessary on the glass during the summer. Autumnal rains are usually sufficient to wash the shading off when its purpose has been fulfilled.

Slugs and snails are nocturnal in habit and so are not easily seen during the day time. Small as they are they can wreak havoc with new fronds over night so the necessity of regular baitings. A yearly overhaul is carried out each winter; dead fronds cut off, plants that are too large removed, new ferns planted and the whole area top dressed with leaf mould and soil.

This is just a selection of the main ferns that grow in Pukekura Parks fernery which is one of the features of the park.

CHECK LIST OF LEPTOSPERMUM CULTIVARS

(Prepared by the Nomenclature Committee of the Royal New Zealand Institute of Horticulture (Inc.), Wellington, New Zealand.)

At the 14th International Horticultural Congress held at Scheveningen in 1955, New Zealand was nominated as the International Registration Authority for the genera *Leptospermum* and *Hebe*.

Mr A. M. W. Greig, Director of the Horticulture Division, Department of Agriculture, in his capacity as New Zealand Representative to the International Committee for Horticultural Congresses, subsequently requested the Royal New Zealand Institute of Horticulture (Inc.) to act as the International Registrar, and this was confirmed at the 15th International Horticultural Congress at Nice in 1958.

Since that time considerable investigation and research into the origin, introduction and status of cultivars of *Leptospermum* has been undertaken by Members of the Institute's Nomenclature Committee. Over the years many cultivars have been listed, introduced and lost to cultivation, so that at the present time they are of historic interest only.

The Nomenclature Committee has not yet prepared a full Register as it considers that the descriptions of many cultivars are so inexact that an accurate Register can be compiled only on the basis of herbarium, or preferably, live material. To this end, a collection of all known cultivars is being established at the Botanic Gardens, Christchurch, New Zealand for study, description and eventual registration.

The vernacular or common names of *Leptospermum scoparium* in New Zealand are either the Maori name 'Manuka' or the English name 'Tea Tree.' As the latter name is already widely used in Australia and the United States of America for plants of the genus *Leptospermum*, this would appear to be the most acceptable common name, although there is no doubt that in New Zealand the name 'Manuka' will still be applied. Possibly to avoid confusion according to Article 17 of the International Code of Nomenclature of Cultivated Plants 1961 the name Tea-tree should be hyphenated. (c.f. 'She-oak' for *Casuarina*). The name Tea-tree is proposed as the acceptable common name.

There is no doubt that the following list will in due course be modified and added to as further information becomes available, particularly regarding the status of Australian species and varieties of *Leptospermum*.

This first list is therefore submitted (in the words of the Code) to promote uniformity, accuracy and fixity in the naming of those *Leptospermum* cultivars now in cultivation. It has been prepared by Mr L. J. Metcalf with assistance from past and present members of the Nomenclature Committee: Messrs M. J. Barnett, P. C. Gardner, the late Mr J. Houston, Messrs K. J. Lemmon, J. Living, A. L. Poole, W. R. Sykes under the Chairmanship of Mr J. P. Salinger and the late Mr C. M. Smith.

REGISTRATION LISTS OF CULTIVAR NAMES IN LEPTOSPERMUM.

J. R. & G. FORST.

In this treatment of *Leptospermum*, two lists are given. The first is alphabetical of all the known cultivar names and the second gives the cultivars again in alphabetical sequence together with the earliest known (to the Committee) bibliographic reference to the cultivar. In the second list, the principal characteristics generally used to define or distinguish the cultivars are given after the reference.

The Committee will appreciate receiving comments, additions or corrections.

ALPHABETICAL LIST.

In this list all cultivars belong to *Leptospermum scoparium* J. R. & G. Forst unless otherwise stated. The asterisk denotes that the cultivar is currently grown in New Zealand and is available under that name from commercial sources or from botanic or public gardens.

Album Flore-pleno	<i>incarnum</i>
*Album Plenum	Intermedium
*Aurora	Kakapo
Boscawenii	*Kea
*Boscawenii Minor	*Keatleyi
Bouffant	*Kiwi
Bullatum	*Kotare
Chapmanii	Kotihe
Deep Rose	Lambethii
Fairy Rose	Leonard Wilson
*Fiesta	*Martinii
Floradora	Milky Way
Garnet Star	Nairnii
*Grandiflorum (<i>lanigerum</i>)	*Nanum
Gwenda Quick	Nichollii
Helen Strybing	*Nichollsii
*Huia	Nichollsii Gloriosum

Nichollsii Grandiflorum	Roseum Multipetalum
*Nichollsii Improved.	Roseum Plenum
Nichollsii Magnificum	Ruby
Nichollsii Nanum	Ruby Glow
Nichollsii Pink form	*Ruby Webster
*Nichollsii Pygmaeum	*Ruru
*Pendulum	Sandersii
Pendulum Roseum	Saundersii
Pompon	*Scarlet Carnival
*Princess Anne	*Snow Flurry
Prostratum	*Snow White
Pygmaeum	*Sylvan Gem
*Red Damask	*Sylvan Pink
Red Sparkler	*Tancredii
Robert Tarrant	Tara
Rose Chiffon	*Tawaki
Rose Double	*Tui
*Rose Gem	*Twinkle
Rosenelf	Walkeri
Rose Red	*Weka
Roseum	Whekau
*Roseum Flore-pleno	

BIBLIOGRAPHICAL LIST

Leptospermum lanigerum (Ait.) Sm.

'Grandiflorum' (R. Jordan, Australasian Nurseries, Auckland, Nurs. cat., 1958), described as having "large white flowers of heavy texture"; a compact bush growing 6-8 feet high.

Leptospermum scoparium J. R. & G. Forst. Char. Gen. Pl. 1776

'Album Flore-pleno' (Duncan & Davies, Nurs. cat. c. 1926) described as having "full double white flowers and strong and compact erect growth."

Album Plenum' (Duncan & Davies, Nurs. cat. 1962), illegit. in syn. of 'Album Flore-pleno'.

'Aurora' (Duncan & Davies, Nurs., cat., 1956), described as having "soft pink flowers."

'Boscawenii' (Bois. Revue Horticole 1912; 520 in Bailey, Stand. Cycl. Hort. 2: 1929, 1843), described as having "flowers 1 inch across, cherry red in bud, white with reddish centre when expanded".

'Boscawenii Minor' (Duncan & Davies, Nurs. cat. 1961) described as a small variety, "soft pink flowers and reddish bronze foliage", height given as 3 feet.

'Bouffant' (Lammerts in Pac. Coast Nurseryman 1946), flowers single pink with the petals positively curved like a ballet skirt.

'Bullatum' (Hort. ex Rehd. in Bailey, Stand. Cycl. Hort. 2: 1929, 1843), described as "leaves larger, narrow: flowers larger, about $\frac{3}{4}$ inches broad". The colour of the flowers is said to be light reddish.

'Chapmanii' (Dorrien Smith ex Bailey in Stand. Cycl. Hort. 2: 1929, 1843), described as "leaves brownish; flowers bright rose". Discovered near Dunedin, N.Z. in 1889 as a wild form.

'Deep Rose' (Duncan & Davies Nurs. Cat. c. 1926). Described as "a beautiful form with pretty rose-coloured flowers."

'Fairy Rose' (Lammerts in Pac. Coast Nurseryman 1946), low spreading habit, dark leaves; flowers double light red.

'Fiesta' (Duncan & Davies, Nurs. cat. 1962) described as "each branchlet festooned with hundreds of $\frac{1}{2}$ inch wide, fully double, frilly blooms in the form of a rosette. A gay bicolour effect is achieved by the rich rosy-red at the base of the petals, shading to a soft apple-blossom pink at the outer edges." Compact in growth, height 5 feet. Originated as a sport from 'Scarlet Carnival'.

'Floradora' (Lammerts in Pac. Coast Nurseryman, 1946), dwarf, spreading, double light red flowers.

'Garnet Star' (Lammerts in Pac. Coast Nurseryman, 1946), semi-dwarf compact; single dark red flowers.

'Gwenda Quick'. An Australian cultivar, as yet unpublished.

'Helen Strybing' (Introduced Strybing Arboretum). Tall, possibly spreading, flowers single, cardinal red. Originated as a seedling of *L. s.* 'Keatleyi' at the Golden Gate Park, San Francisco.

'Huia' (Duncan & Davies, Nurs. cat. 1956), described as "a deep pink form", height given as 18-24 inches. A 'Nanum' seedling".

incarnum (Ckn. T.N.Z.I. 49, 1917, 58). Leaves lanceolate or linear-lanceolate. Tips of shoots usually covered with silky hairs. Large flowers tinged pink. Common in North Auckland District.

'Intermedium' (Duncan & Davies Nurs. cat. 1928) described as "an intermediate form with crimson flowers".

'Kakapo' (Duncan & Davies, Nurs. cat. 1956), described as "pink and red, late". A 'Nanum' seedling.

'Kea' (Duncan & Davies Nurs. cat. 1956) described as "very early pale pink", height 18-24 inches. A 'Nanum' seedling.

'Keatleyi' (Duncan & Davies, Nurs. cat. c. 1926), flowers a soft pink with wavy edged petals. One of the largest flowered cultivars. Discovered in the Hokianga district of the North Island, New Zealand. A.M. R.H.S. 25 April, 1961. Considered to be a selection of *Leptospermum scoparium* var. *incanum*.

'Kiwi' (Duncan & Davies, Nurs. cat. 1956), described as "a light red variety which flowers in mid-season", height 18-24 inches. A 'Nanum' seedling.

'Kotare' (Duncan & Davies, Nurs. cat. 1956), described as "a pink and red style excellent for the rockery", 18-24 inches high. A 'Nanum' seedling.

'Kotihe' (Duncan & Davies, Nurs. cat. 1956) described as "pink, late". A 'Nanum' seedling.

'Lambethii' (Duncan & Davies Nurs. cat. c. 1945), flowers rose to rose-red fading with age.

'Leonard Wilson' (L. Cockayne in Trans. N.Z. Inst., 50; 1918, 179), described as having "double white flowers". Discovered at Port Levy, Banks Peninsula, New Zealand, as a wild mutant. Probably the same as 'Album Flore-pleno.'

'Martinii' (Duncan & Davies, Nurs. cat. c. 1945), described as having "a mass of rose to rose-red flowers from July to October; foliage light bronze". Raised by Mr Martin, Aramoho, Wanganui, New Zealand. Very similar to 'Lambethii'.

'Milky Way' (Lammerts in Pac. Coast Nurseryman, 1946) flowers single white and apparently not much different from wild *L. scoparium*.

'Nairnii' (Nairns Nursery Ltd., Christchurch, N.Z. Nurs. cat.) *Illegit.* as *nomen nudum*.

'Nanum' (Duncan & Davies, Nurs. cat. c. 1940-42), a low growing form seldom exceeding 12 inches in height. Foliage bronze-red; flowers pale pink. This is the parent of twelve dwarf cultivars raised by Duncan and Davies and to which they applied the names of native birds.

'Nichollii' = 'Nicholsii'.

'Nichollsii' (Turrill in Bot. Mag. 8419, 1912) as *L. scoparium* var. *Nichollii*). Shrub 6 or 8 feet; foliage dark purplish bronze, flowers carmine. Named after a Mr William Nicholls, a skin and wool buyer of Belfast, Canterbury, New Zealand, from whom the nurseryman Mr Robert Nairn obtained the seed which produced this cultivar. The change of name from 'Nichollii' to 'Nichollsii' occurred circa. 1920 and the latter is now the accepted name in Horticulture in New Zealand.

'Nichollsii Gloriosum' (Marchant, Keepers' Hill, Engl. Nurs. cat. 1937), a pink flowered seedling from 'Nichollsii'.

'Nichollsii Grandiflorum' (Hillier & Sons, Winchester, Engl. Nurs. cat. 1950), described as "a selected large flowered form".

'Nichollsii Improved' (Duncan & Davies, Nurs. cat. C. 1940-42). A bright red flowered form similar to 'Nichollsii' but with larger flowers and a more floriferous and open habit. This is the correct name for the cultivar commonly sold in N.Z. as 'Nichollsii'.

'Nichollsii Magnificum' (W. Hazlewood & Sons, N.S.W., Aust., Nurs. cat. 1954).

'Nicholsii Nanum' (Jour. R.H.S. 88, 1963, 35 as *L. scoparium* var. *nicholsii* 'Nanum'). A dwarf and compact form selected by Mr J. Hope, Ness, Wirral, England. It appears to be little different from 'Nicholsii Pygmaeum'.

'Nichollsii Pink Form' (Hillier & Sons, Winchester, Engl. Nurs. cat. 1952), described as "a pretty pink variant, with greener leaves." Possibly same as 'Nichollsii Gloriosum'.

'Nichollsii Pygmaeum' (Duncan & Davies, Nurs. cat., c. 1928), an exceptionally dwarf and compact form of 'Nichollsii'.

'Pendulum' (Duncan & Davies, Nurs. cat. 1961), described as "a weeping form of the common manuka, with pure white fls."

'Pendulum-roseum' (Duncan & Davies, Nurs. cat. 1961) very similar to 'Pendulum' but with very pale pink flowers.

'Pompon' (Lammerts in J. Calif. Hort. Soc., 6, 1945, 250-57), described as "tall compact shrub; flowers super double, petals rose doree red type with colour restricted to the base".

'Princess Anne' (Kingsbeer's Nurseries, Palmerston North, N.Z. cat. 1962). "Double Pink".

'Prostratum' (Hook. fil., in Flora of N.Z., 1, 1864, 70.), described as "prostrate, branches ascending. Leaves ovate or orbicular, recurved." This or similar forms are occasionally met with in cultivation.

'Pygmaeum' (Duncan & Davies, Nurs. cat. c. 1928), described as "a dwarf form with reddish foliage and crimson flowers."

'Red Damask' (Lammerts in Pac. Coast Nurseryman, 1946), semi-dwarf compact; flowers a very deep red, fully double.

'Red Sparkler' (Lammerts in Pac. Coast Nurseryman, 1946), semi-dwarf, compact; flowers a very deep red, fully double.

'Robert Tarrant' (W. Hazlewood & Sons, N.S.W., Aust., Nurs. cat. 1954), fine double pink flowers; medium bushy habit.

'Rose Chiffon'. (Lammerts in Pac. Coast Nurseryman, 1946), tall compact, very large single flowers with rose doree petal base.

'Rose Double' (Lammerts in J. Calif. Hort. Soc., 6, 1945, 250-57), flowers pale pink; semi-dwarf habit. This name may be *illegit.*, as far as is known it has not been correctly published.

'Rose Gem'. (Duncan & Davies, Nurs. cat. c. 1945), a rose-pink variety of early flowering habit. Flowers similar to but smaller than 'Keatley'.

'Rosenelf' (Lammerts in J. Calif. Hort. Soc., 6, 1954, 250-57), semi-dwarf, spreading, single flowers with rose doree petal base.

'Rose Red' (Lammerts in J. Calif. Hort. Soc., 6, 1945, 250-57), a compact dwarf with purple stems and double, carmine-red flowers.

'Roseum' (Jour. R.H.S. 54, xlii) described as "foliage is greyish-green and the flowers nearly an inch across, in colour soft rose-pink, with dark centres". A.M. R.H.S. 14 February 1928.

'Roseum Flore-pleno'. (Duncan & Davies, Nurs. cat. c. 1926), has full double, light rosettes of soft pink flowers.

'Roseum Multipetalum' (Jour. R.H.S. 54 xlii). "Double pink flowers". A.M. R.H.S. 14 February, 1928.

'Roseum Plenum'. (Duncan & Davies, Nurs. cat. 1961), *illegit.* in syn. of 'Roseum Flore-pleno'.

'Ruby' (Duncan & Davies cat. C. 1945). Described as "a selected type free flowering habit, flowers bright ruby red".

'Ruby Glow' (Lammerts in J. Calif. Hort. Soc., 6, 1945, 250-57), a tall compact shrub, with dark purple stems and somewhat glossy leaves; flowers super double, ox blood red and very large.

'Ruby Webster'. An as yet unpublished New Zealand cultivar.

'Ruru' (Duncan & Davies, Nurs. cat., 1956), described as "a deep pink which flowers late in the season", height 18-24 inches. A 'Nanum' seedling.

'Sandersii' (Duncan & Davies, Nurs. cat. c 1926), a winter and spring flowering variety with single pink flowers edged with white and a darker centre. Raised by Mr C. Sanders, of New Plymouth, N.Z.

'Saundersii' = 'Sandersii'.

'Scarlet Carnival'. (Lammerts in Pac. Coast Nurseryman, 1946), fully double scarlet-red flowers, freely produced on compact growths. Similar to but earlier flowering than 'Red Damask'.

'Snow Flurry'. (Lammerts in Pac. Coast Nurseryman, 1946), tall spreading, double white flowers.

'Snow White'. (Lammerts in J. Calif. Hort. Soc., 6, 1945, 250-57), a compact dwarf with double white flowers.

'Sylvan Gem' syn. 'Sylvan Pink'.

'Sylvan Pink' (Kingsbeer Nurs. cat. 1962) *Nomen nudum*.

'Tancredii' (Duncan & Davies, Nurs. cat. c. 1945), a distinct deep rosy-pink flowered variety, with semi-double flowers; petals frilled.

'Tara' (Duncan & Davies, Nurs. cat., 1956), described as "Pink, very compact". A 'Nanum' seedling.

'Tawaki' (Duncan & Davies, Nurs. cat., 1956), described as "a very dense grower, pink in colour and a late flowerer", height 18-24 inches. A 'Nanum' seedling.

'Tui' (Duncan & Davies, Nurs. cat. 1956), described as "a pale pink which flowers very early in the season", height 18-24 inches. A 'Nanum' seedling.

'Twinkle' (Lammerts in Pac. Coast, Nurseryman, 1946); tall, compact plant, single light red flowers.

'Walkerii'. (Duncan & Davies, Nurs. cat. C. 1926), white parti-coloured flowers; the basal colours white to deep pink. Said to have been raised by Mr F. Walker, of Wanganui, N.Z.

'Weka'. (Duncan & Davies, Nurs. cat., 1956), described as "a pink form which chooses the late season for flowering." Height 18-24 inches. A 'Nanum' seedling.

'Whekau'. (Duncan & Davies, Nurs. cat. 1956), described as "light pink, late". A 'Nanum' seedling.

1964 ANNUAL DOMINION CONFERENCE
of the
ROYAL NEW ZEALAND INSTITUTE OF
HORTICULTURE (INC.)

NOTICE IS HEREBY GIVEN that the Forty-first Annual Meeting and Conference of Delegates of the Royal New Zealand Institute of Horticulture (Inc.) will be held in the **Auditorium, Otago Museum, Great King Street, Dunedin** on **Thursday, 13th February 1964**, commencing at 9 a.m.

THE BANKS LECTURE will be delivered at 8 p.m. on 13th February by Mr. J. T. Holloway of the N.Z. Forest Service, Rangiora, and will be entitled 'Man and the Vegetation of the Mountain Lands'.

BRIEF PROGRAMME:

12th and 13th February — Dunedin Horticultural Society Show.

12th February—Civic Supper (Evening).

13th February—Conference and Banks Lecture.

14th February—Scenic Tour of Dunedin (if sufficient members present).

Members of the Institute and delegates from affiliated organisations are specially invited to attend this Conference. The Otago District Council is planning arrangements for the complete comfort and enjoyment of visitors.

Rail, Steamer and Air Concessions (10% reduction) will be available to delegates (dependent upon minimum numbers using) upon application to the Dominion Secretary.

Those attending the Conference are strongly advised to make early Hotel reservations direct with the hotel of their choice.

HOTELS (licensed):

City, Princes St.	65/- to 90/- per day.
Grand, High St.	57/6 to 75/- " "
Wains, Princes St.	55/- to 60/- " "
Excelsior, Cnr. Dowling and High Streets	56/- " "
Law Courts, Cnr. Stuart and Cumberland Streets	55/6 " "
European, George St.	52/6 " "
Criterion, Moray Place	50/- " "

HOTELS (Private):

Leviathan, Cnr. High and Cumberland Streets	34/6 per day.
Chalet Gfeller, 62 Walter Street	38/- D.B.B., 31/6 B.B.
Hosford House, 23 London Street	36/- D.B.B., 29/6 B.B.
Hotel Central, 100 Princes Street	25/- B.B.

K. J. LEMMON,
Dominion Secretary.

DOMINION COUNCIL NEWS

With a view to widening interest in the activities of the Institute and to keeping members more closely informed, the Dominion Council has decided to publish some news-in-brief following each quarterly meeting of the Dominion Council.

Anti-litter Campaign: The Government and Local Bodies are being urged to enforce existing laws and bylaws against the casting of litter. Public opinion must be built up against the menace of litter.

National Research Advisory Council: The Parliamentary Bill to institute the National Research Advisory Council is receiving close attention to ensure that Horticulture is catered for in our future national research programme.

International Horticultural Science Congress: The Government will be approached at the appropriate time for the holding of this Congress in New Zealand in 1974. The Institute is a member of the International Society for Horticultural Science and is the accredited International Registration Authority for the genera *Hebe* and *Leptospermum*.

New District Council at Gisborne: Following a visit by the Dominion President, the Dominion Secretary and Mr. A. M. W. Greig to Gisborne in July where they attended and addressed a public meeting to discuss the work of the Institute, Poverty Bay District Council was formed with an initial membership of 25.

Commonwealth War Graves Commission: The Institute has entered into correspondence with the Commission over suitable plantings of New Zealand Native shrubs and trees in overseas cemeteries where New Zealand Servicemen are interred.

Beautification of Highways, Housing Development and Public Works: The employment of landscape architects in all these projects to ensure adequate and planned beautification is being stressed with the Government. Likewise adequate provision for the protection and preservation of historic and notable trees in land and housing development schemes.

Plant Raisers' Awards: After a lapse of several years, this Award has been revived and the first awards under revised conditions have been made, — to Dr. J. S. Yeates, of Palmerston North, for the *Lilium parkmannii* hybrid 'Excelsior', and to the late Dr. Rodney Francis, of Hastings for the floribunda rose 'Cresset'.

Nomenclature Committee's Work: Preparation of the initial list of *Leptospermum* is nearing completion. Work is also being done on the genera *Hebe* and *Pittosporum* to bring out similar lists.

1964 Dominion Conference: To be held in Dunedin on 13th February. The Conference is open to members of the Institute as well as to official delegates from District Councils. Members are encouraged to attend, particularly those living within close proximity to Dunedin.

PUBLICATIONS RECEIVED

A GARDEN CENTURY, The Christchurch Botanic Gardens 1863-1963, by M. J. Barnett, M.B.E., A.H.R.H.S., A.H.R.I.H. (N.Z.), N.D.H. (N.Z.); H. G. Gilpin, A.H.R.I.H. (N.Z.), N.D.H. (N.Z.); L. J. Metcalf, N.D.H. (N.Z.); E. G. Turbott, Assistant Director, Canterbury Museum. Published by the Christchurch City Council.

This attractively produced volume has been prepared to commemorate the first centenary of the Christchurch Botanic Gardens. Transformed from 75 acres of barren sandhills, into one of the leading botanical gardens of the world, these have developed into a space of great beauty where can be seen

growing in a charming setting the finest collection of exotic and indigenous plants in the Dominion.

The story of the first hundred years is an absorbing one to all readers, horticultural or otherwise. In it we see that gardening spirit, inherent in the Anglo-Saxon race, bringing from distant Britain that love of plants that did so much to bring our gardens to that high standard that is evident today. The early development of the Botanic Gardens was in the hands of Enoch Barker, J. F. and J. B. Armstrong, Ambrose Lloyd Taylor and James Young, who were largely responsible for the present lay-out. Due regard to the likely ultimate dimensions of a noble tree of the forest and judicious thinning out from time to time, added to skilled attention and an understanding of a tree's requirements have combined to make these gardens a horticultural centre of which the Southern Hemisphere may well be proud. It is fortunate that, since the early days of development, other men of an equal calibre to their forbears have guided the destiny of these Gardens. Broad lawns, vistas of greensward, ornamental lakes and gently flowing streams, all in an informal setting and planted with an infinite variety of trees, shrubs, perennials, alpine and aquatic plants are features that provide interest for every week of the year. In the glasshouses are many tender plants, grown to perfection by experienced plantmen.

The illustrations are a worthy addition to the book and all, whether in colour or black and white, are excellent. The detail of the beautiful bark of the old specimens of *Pinus pinaster* in the coloured illustration facing Page 56, is particularly well done.

At the end of the book is given a list of Historic Trees planted by eminent persons or in commemoration of some important event. For the guidance of visitors and readers there is a map of the gardens. It is with a feeling of satisfaction that I place this book on my shelves as a worthy companion to that written on the Royal Botanic Gardens, Kew, on the occasion of their bi-centenary a year or so ago.

DISTRICT COUNCIL REPORTS

WAIKATO.

The Annual Meeting of Waikato District Council was held in October and Mr R. T. Fear, F.R.I.H., was elected President for the year. Mr Fear delivered a most interesting illustrated address on gardens in England that he and Mrs Fear had visited. The monthly meetings were well attended and there was an excellent panel of speakers. Mr Edwin Hatch, Auckland, spoke on native orchids; Mr R. Rose, Hamilton, dealt with mushrooms and toadstools; Mr V. C. Davies, New Plymouth, described new and choice shrubs for the Hamilton district; Colonel T. Durrant, Tirau, spoke on camellias; Mr J. N. Parle Ph.D., discussed soil insects and their control. There was also a panel discussion on rhododendrons. Identification of plants was a popular feature of these meetings. Various field days during the year were well attended when visits to various well known gardens, nurseries and parks and reserves were made.

WHANGAREI.

'Illustrations of New Zealand Plants' was the title of a lecture delivered by Dr. R. C. Cooper, of the Auckland Museum, at the August meeting of the Whangarei District Council.

Beginning with examples of the work of such early engravers as L'Obel (botanist to James I) and in whose honour the genus *Lobelia* was named, the story continued through the centuries to Cook's discovery of New Zealand,

and right up to our own day. We were most impressed by the skill and delicacy of those artists of by-gone ages. Their thoroughness and attention to detail often gave a more informative picture of plant specimens than many presented by so-called superior modern methods. As an example, the exquisite drawings in black and white of *Gleichenia* and of *Cyathea dealbata* could scarcely be equalled by any device of present-day photography.

The frontispiece of an ancient Herbal of the sixteenth century was as clear-cut and readable as though it might have been less than half that age. Another botanical artist of the seventeenth century was Charles Plumier, a Frenchman concerned more with the plants of tropical America, in whose honour was named the genus *Plumeria*, the Frangipanni. Next came the Father of Botany, Carl Linnaeus, a Swede who came to England, and made the first simplified classification of plants, a system still in use. His name and fame are honoured in the Linnean Society, founded in England in 1788.

Coming nearer home and nearer our own times is a pupil of Linnaeus, Dr. Solander, who came with Sir Joseph Banks in Cook's ship 'Endeavour' on its first voyage, and discovery of New Zealand in 1769. Banks was a wealthy man, a great naturalist, and brought with him a large staff which included four artists. Among these was Sydney Parkinson, some of whose beautiful work was shown by Dr. Cooper. Of the 300 sketches made by these artists, many were of our native plants familiar to us all — Parataniwha, sometimes known as *N.Z. Begonia*, because of its fleshy stems and large, pinkish-brown leaves, Cook's Scurvy Grass (*Lepidium oleraceum*), Karaka and *Astelia*. Cook's Scurvy Grass he used as a green vegetable to combat scurvy. It is now almost extinct, having been eaten out by cattle. On Cook's next voyage came the two Forsters, father and son George, who also made drawings of our plants, notable among which are the Poroporo — *Solanum aviculare*. After Cook came the French, also with botanists and artists, Dr. Raoul, the surgeon and botanist, did much collecting and investigation of plants at Akaroa, and is commemorated in genus *Raoulia* — the Vegetable Sheep family. He afterwards published the book 'Choix de Plantes de la Nouvelle Zelande' which contained many beautiful illustrations. Then came Sir J. D. Hooker, in the early 1840's with Sir James Ross' expedition. His collections and descriptions of plants, especially those remarkable ones of the Auckland Islands, advanced the knowledge of our splendid flora. Illustrated here were *Phebalium nudum* (found in Waipoua), *Olearia colensoi*, and the Marlborough tree dairy *Pachystegia insignis*, generally found growing on limestone cliffs.

Among the pictures shown by Dr. Cooper were yellow rata, *Quintinia serrata*, *Pimelea longifolia*, *Ixerba*, often seen at Waipoua and Waikaremoana, and the rare yellow *Rhabdothamnus* from the Barrier. New Zealanders were well represented in this galaxy of talent, and there are several distinguished names among them. These include Miss Ella Blumhardt, formerly a teacher at Whangarei Girls' High School; Mrs Featon, whose book of illustrations of New Zealand Plants is known to many; Mrs Osborne of Great Barrier, whose pictures of *Hibiscus trionum* and *Clivanthus puniceus* gave us much pleasure; and last, but by no means least, Miss Nancy Adams of the Auckland Museum.

'What's for Dinner', was the title of an address given by Mr Alex Cameron, F.R.I.H. (N.Z.) to the District Council of the Royal N.Z. Institute of Horticulture at its September meeting.

Though Mr Cameron disclaimed any right to be called an expert, he has over the many years proved his ability and the success of his methods of growing vegetables, not only in the easier seasons but throughout the year. His talk gave ample proof of this, and those who might have thought vegetable growing a dull subject were rapidly disillusioned. Some old ideas were neatly exploded and newer methods brought forward with the wit and precision we have come to expect from Mr Cameron.



THE SOULANGEANA CLAN — *Magnolia liliflora*.
(Stewart Studios) (See page 201)



DAMAGE TO FLOWER SEEDS BY THIRAM.

Fig. 1. Symptoms of funnel-leaf, caused by thiram toxicity, in *Nemesia* seedlings. The plant on the left of the picture is healthy.

(See page 214)

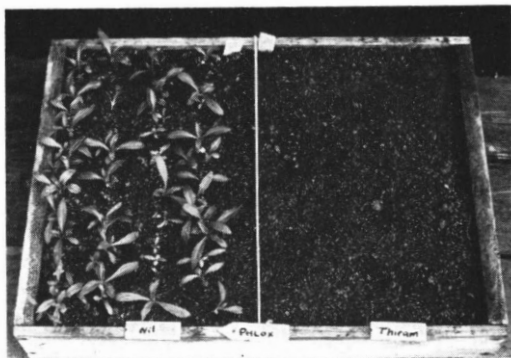
Photograph — A. Underhill

DAMAGE TO FLOWER SEEDS BY THIRAM.

Fig. 2. Thiram toxicity in *Phlox drummondii*. One hundred seeds were sown in each half of the box.

(See page 214)

Photograph — A. Underhill





Platycerium bifurcatum with fertile frond turned back to show spore bearing region. (Note there is a slight injury to the frond just above the fork).

(See page 209)

A well established Stag's Horn Fern

(See page 209)

(Photo Bernard Teague)



Platycerium bifurcatum showing young nest leaf with old one beneath it.

(See page 210)

Serving his apprenticeship to gardening on the difficult pipe clay soil of Dargaville, Mr Cameron said he learned by trial and error and by seeking advice from other growers. In those days deep digging was thought to be necessary, putting manures well down in the soil. Nowadays and particularly on our light soils shallow cultivation with manures or composts in the top 4 inches and the heavy rains soon took the plant foods down to the roots where they were needed.

Vegetable growing was important for economic reasons (saving up to £2 per week for a family) but still more important for health. Man is only as good as the food he eats, and his food is only as good as the soil it is grown on. The pioneers of this country were remarkably healthy and long lived because their food (animal as well as vegetable) was produced on virgin soil. By continual and often indiscriminate cropping, soil became so impoverished that great quantities of expensive manures were needed to ensure crops.

Pukekohe ground was one example of this short sighted treatment.

Green crops, compost and grass clippings added to the top few inches of the soil were all ways of maintaining soil fertility. None of these should be covered too deeply as air was essential for decomposition, and soil bacteria worms worked more successfully in such conditions. The more diversity in compost materials the better, and it should be realised that the resultant product could not contain elements which might be absent from the ingredients. He therefore believed in adding such things as blood and bone, super and potash. A good and reliable addition was the ordinary potato manure mixture.

Success then depended on what you did after planting. Firmness in planting and in seed sowing was essential. Mulching, cultivation, manuring and watering were all most essential. Mulch with compost, cultivate between rows, manure lightly before rain, and water in the heat of the day, and good growth would follow. The nozzle should be removed from the hose and water allowed to trickle in so that it reached the roots which could not take in food unless it were in soluble form. He advocated watering in the heat of the day rather than evening to prevent chilling of the soils and consequent shock to roots.

Cultivation should be done to keep the surface open and soft and for this purpose he demonstrated the use of a two pronged fork on the end of a very long handle, otherwise a very small sharp pointed Dutch hoe was effective especially among small plants.

CANTERBURY.

Following the recent Annual Conference of the R.N.Z.I.H. held in Christchurch last February and in particular the Banks Lecture for 1963, 'The Indigenous Flora of Banks Peninsula', delivered by Mr Wm. Martin, B.Sc., of Dunedin, a period of sustained activity has been pursued by the Canterbury District Council.

Shortly after the Banks Lecture, on April 7th well over 30 members of the Institute made a rendezvous at Prices Valley which had been mentioned as still containing most of the trees typical of the Banks Peninsula forest cover in its primeval state. Those fortunate enough to attend the Banks Lecture will remember Mr Martin showing several colour slides of this bush remnant. After lunch in these peaceful sylvan surroundings some 30 miles South of Cathedral Square the members of the party spent a most instructive and interesting afternoon under the leadership and tutelage of Messrs A. J. Healy and L. J. Metcalf, of the Botany Division, D.S.I.R., and the Christchurch Botanic Gardens respectively. Mr Healy states that this is practically the only surviving relic typical of the rain forest that once covered most of the Peninsula. A mixed podocarp forest reminiscent of more northern areas, the predominant tree on the valley floor is the stately Kahikatea or white pine. The valley is named after Joseph Price who in the 1830's left his ship and settled in that vicinity.

Our next venture was to a spot that may be termed the birthplace of Christchurch, for at Deans Bush the Deans Brothers settled and built the first house on the Plains in 1843. They named their holding Riccarton after their native parish in Ayrshire and so gave the name to the area and borough abutting the Western boundary of Hagley Park. This bush is of great botanical significance for it is typical of the patches of swamp forest that occurred on isolated parts of the Canterbury Plains. The other significant patch of bush in what is now the city area, the Papanui Bush, has long since disappeared under the hand of man. Naturally in this wet area the kahikatea predominates and it is typically mixed New Zealand swamp forest. Mr Healy reports that with the gradual elimination of the many exotic intruders that have made their home in Deans Bush that indigenous species are on the upgrade, and that on a recent count he listed over 140 native species. Over 40 members were conducted over the bush by Mr Healy and Mr John Deans, a direct descendant of those earliest of pioneers.

On the evening of May 29th the Annual Presentation of Certificates and Prizes was held, and the following received the tokens of their awards and their prizes from Mr M. J. Barnett, M.B.E., A.H.R.H.S., A.H.R.I.H. (N.Z.), N.D.H. (N.Z.), F.R.L.H. (N.Z.), Messrs I. M. Barclay (in absentia), C. Jones and W. R. Bestman; *Junior Memorial Prizes* 1961, Mr M. J. Duffield; 1962, Mr W. Scadden; *Certificates—Intermediate N.D.H.*, Mr G. L. Jones; and *Junior N.D.H.*, Messrs P. Thompson (in absentia) and L. Whittle. Following the presentation we were entertained by three overseas students from Lincoln College who spoke on their native lands more particularly as regards horticulture and agriculture. The students were Mr Paul Okoro from Nigeria, the holder of a Special Commonwealth Aid for Africa Programme Bursary; Mr Tile Imo of Samoa, who holds a Union Steam Ship Company Bursary; and a Malayan, Mr Loh Charn Lum, a Colombo Plan student. Colour slides of their native lands were shown and commented upon by these students who were roundly applauded for their efforts. This was followed by an address by Mr L. Matthews, son of the Editor of *'The New Zealand Gardener'*, on his recent sojourn in the U.S.A. and this was illustrated by many fine colour slides.

The afternoon of the 16th June saw nearly 60 members assembled at J. O. Taylor's plant hire nursery to look over his eight large glasshouses and their interesting contents. Though the day was fine and sunny a bitterly cold wind made the shelter of the houses doubly welcome and it was most instructive to see the means adopted by Mr Taylor for the propagation, culture and care of his many thousands of plants which unlike the ordinary nursery plants, are carried on to maturity or near maturity. The effectiveness of Mr Taylor's methods was exemplified by the vigour and cleanliness of his plants on a date so near the winter solstice.

THE 1963 CONFERENCE

FRUIT GROWING IN THE HOME GARDEN

Instead of an all day Conference as in previous years this time it was spread over three evenings and a Saturday morning, mainly to suit the convenience of the menfolk whom it was felt would be the ones interested in the main by this subject. This innovation was quite successful for despite bitterly cold nights and the ravages of 'flu among the members the nightly attendances were between 70 and 80.

The first evening, June 28th, dealt with the pip and stone fruits under the following headings:—'Growing the Tree and the Crop'; 'Planning the Home Orchard'; 'Diseases and Pests and Their Control'; 'Thinning, Harvesting and Storing'. The speakers were Messrs S. Frew, G. F. Thiele, R. E. Yates, and R. Tilley, respectively who later formed a discussion panel which dealt most ably with the many questions asked on the above subjects.

On the following evening Messrs S. Frew, C. S. Richardson, J. Coombe and R. E. Yates dealt with the growing of berry fruits and with fruits not generally grown around Christchurch as follows:—'Growing Berry Fruits'; 'Propagation, Planting and Varieties'; 'Diseases, Pest and Spraying'; 'Grapes and Other Fruits Sometimes Grown in Christchurch'. The same procedure was followed as previously, the speakers again constituting a discussion panel and again this was so popular that in due course the closure had to be applied. The last heading included grapes, citrus, feijoas, Chinese gooseberries and other fruits regarded here as half hardy or tender.

The final evening was devoted to the pruning of all the fruits previously discussed as hereunder:—'Objects and Principles of Pruning', Mr G. F. Thiele; 'Pruning Pip and Stone Fruits', Mr S. Frew; 'Pruning Berry Fruits, Grapes and Other Fruits', Mr G. Hicks; and once again the discussion panel was a popular feature of the evening.

The Conference culminated in an outdoor pruning demonstration at Lincoln College on the morning of July 6th. The College offers a most extensive range of fruits and varieties such as no commercial grower can hope to equal, and the audience saw Mr G. Thiele demonstrate the pruning of apples, pears and peaches on his home ground, whilst Mr S. Frew of the Department of Agriculture showed how plums, apricots and berry fruits should be treated by the pruner. A feature of the demonstration was the pruning of espaliers, fans and cordons, and it may be fairly said of the whole Conference that seldom has this subject been so comprehensively and adequately handled. This may be verified by perusal of the Proceedings which are available from Mr D. Field, Hon. Secretary, Canterbury District Council, R.N.Z.I.H., 71 Mandeville Street, Christchurch 4, or from Mr J. H. Watt, 2660 Centaurus Road, Christchurch 2, at the modest price of 5/-.

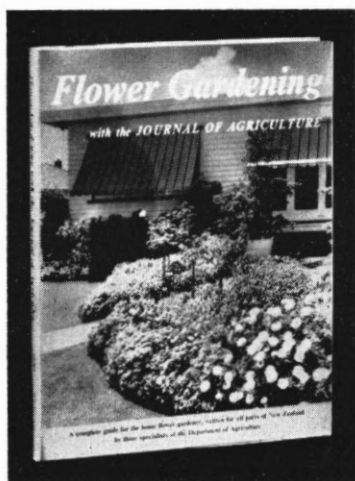
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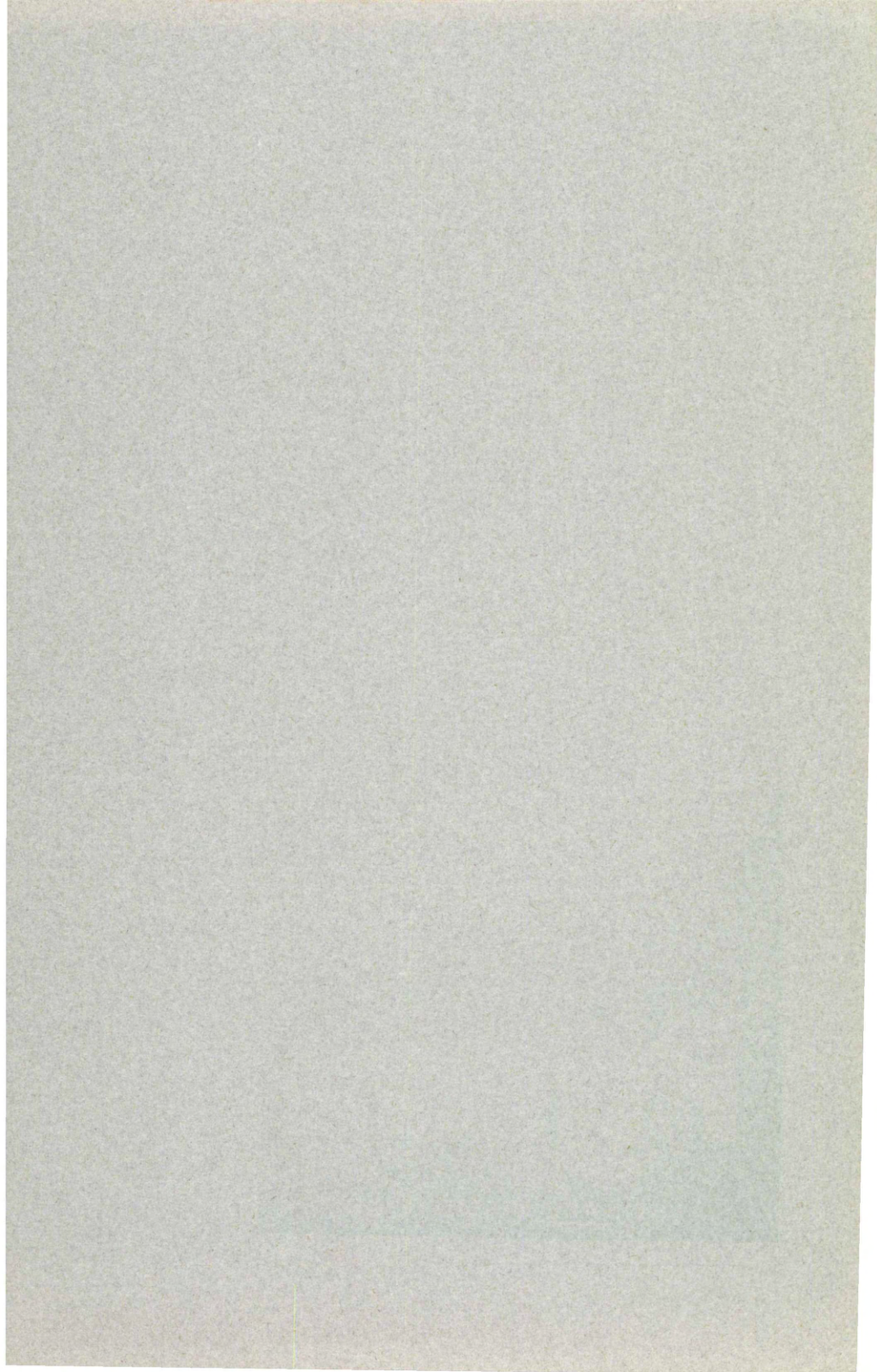
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