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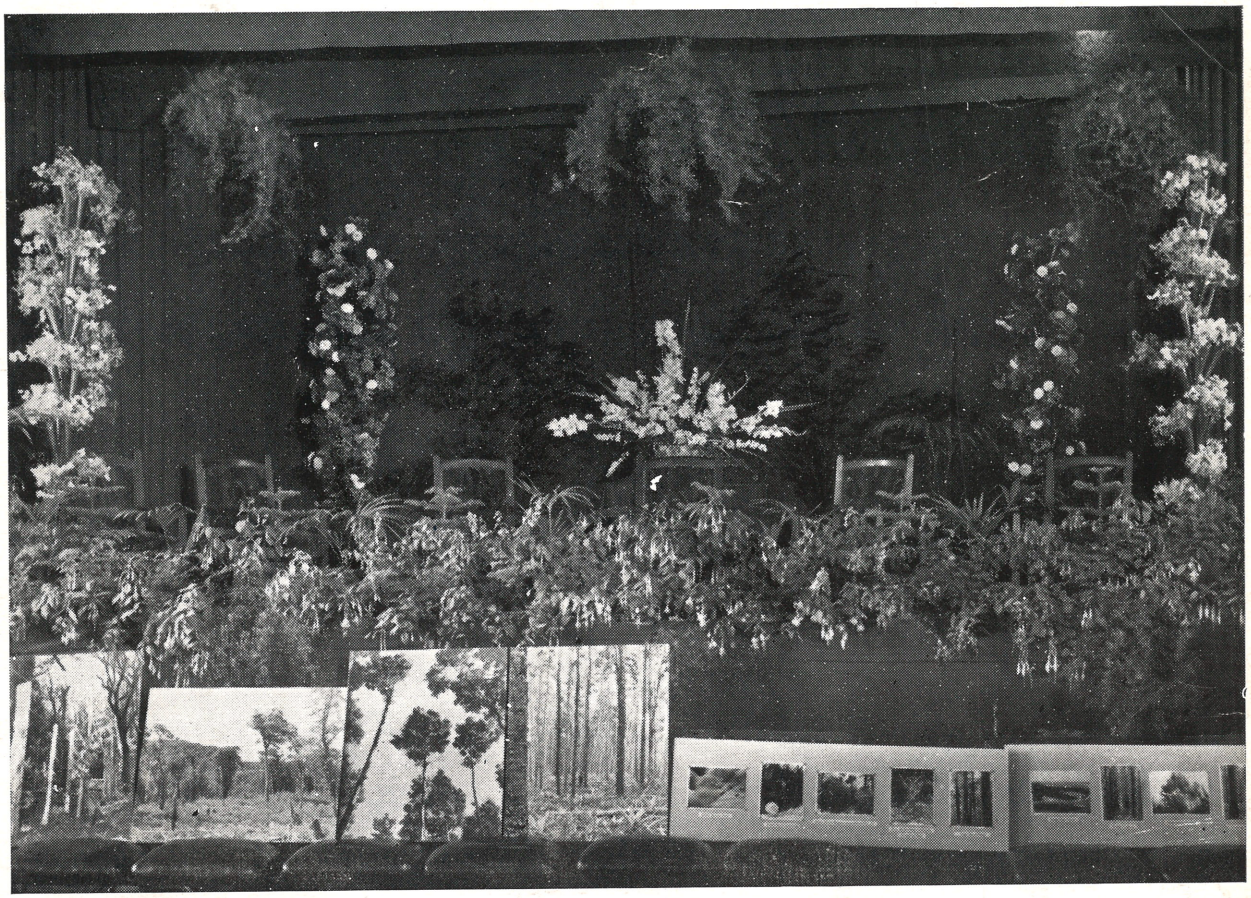

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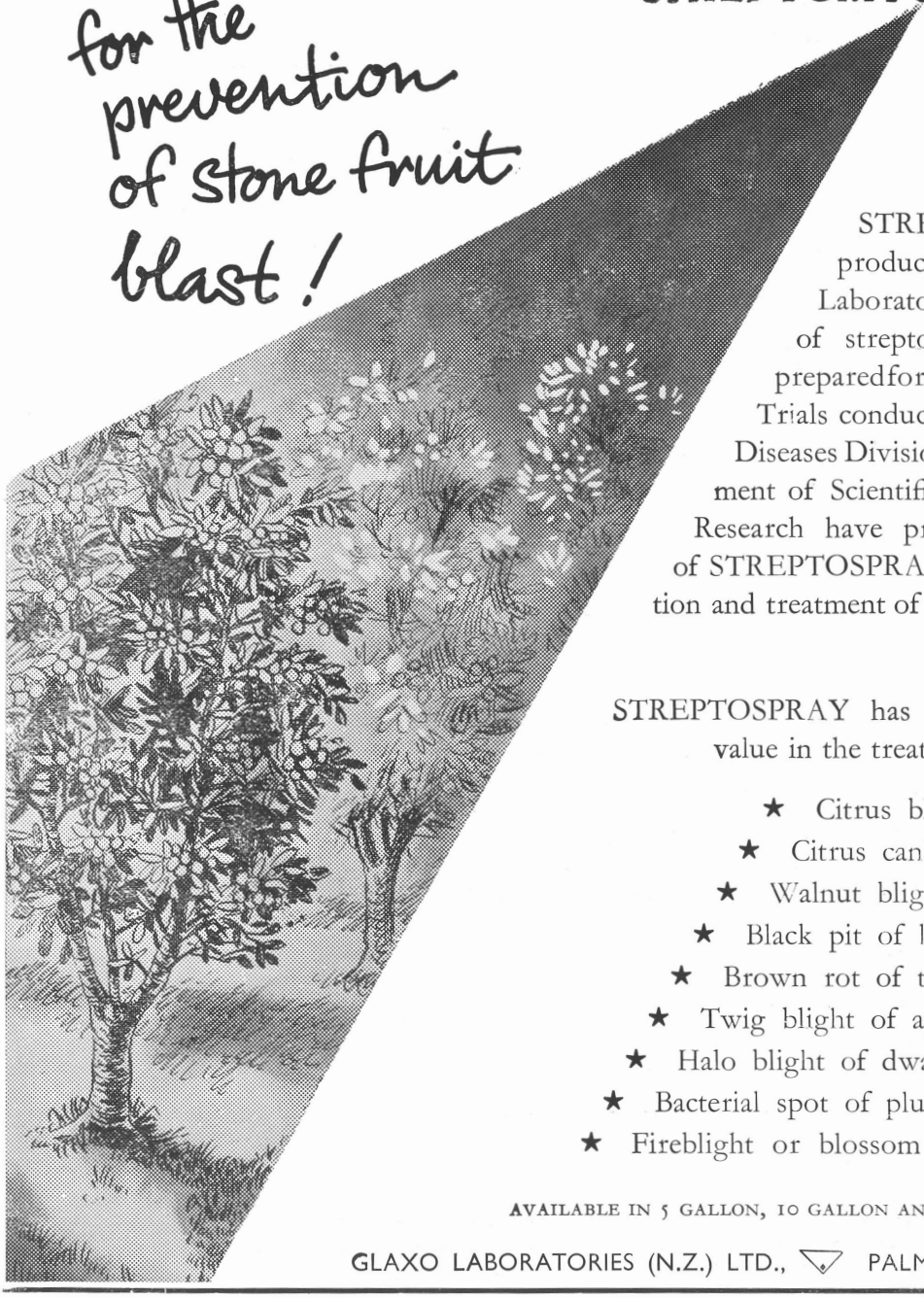

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March, 1956.

New Zealand Plants and Gardens

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

Editorial . . .

Pride and Prejudice

SINCE primitive man first improved his skill at those pursuits which preserved his livelihood, succeeding generations have taken a fierce pride in developing craftsmanship in every sphere of human activity. An integral part of this pride has been a deep-rooted conservatism and resistance to changes. This conservatism was to some extent necessary since the only means of training the next generation was to insist on blind adherence to the methods practised over the years.

In the industrial field great changes occurred in the eighteenth and nineteenth centuries. The gradual rise of science pointed out facts which could be used to improve methods of production of various items which we now consider essential. Excellent though the craftsmen of those days were, the technical advances which were made could never have come about without the assistance of men who were not necessarily craftsmen.

While some of us may long for the "good old days" of our imaginations, few of us would willingly return to the days of subsistence husbandry, and no manufacturing as we know it today. Yet, far as we have progressed along the path towards adequate provisions of man's needs, industry still demands the services of an army of scientists and technologists who can point the way to further improvements in technique.

It is perhaps natural that those whose life brings them into closest contact with nature should retain to the last their pride in craftsmanship and prejudice against change, for all forms of plant and animal husbandry depend to a considerable extent on that manual dexterity and exercise of judgment which we call craftsmanship.

In agriculture the scientist has already shown how accepted practices can be improved upon and some of these changes in technique have led to spectacular advances in production. If horticulture is to keep pace with modern conditions we must ensure that we, too, are ready to welcome into our ranks the scientist, who, although not a complete craftsman, can view objectively our techniques and practices, and suggest where improvements can be made. Dr. McMeekan's contribution to agriculture would not be lessened if he were unable to plough a straight furrow!

Correspondence and articles for publication should be addressed to The Editor, c/o. The Royal New Zealand Institute of Horticulture (Inc.), P.O. Box 1368, Wellington. Small advertisements and enquiries re trade advertisements should be addressed to Industrial Publications, P.O. Box 6402, Te Aro, Wellington.

Book Review

PLANT VIRUS DISEASES IN NEW ZEALAND.

by E. E. Chamberalin

The plant virus diseases have assumed great importance in horticulture, and Dr. Chamberlain is to be congratulated upon the production of a book which deals clearly and concisely with those which occur in this country. The first part of the book discusses briefly the various aspects of virus disease in general, including method of spread, etc., and methods of control as known at present. Part two gives a complete description of the virus diseases which have been identified as such in New Zealand including the symptoms which each produces on its host plant. Part three gives a list of the plants known to be hosts for virus in New Zealand thus providing an easy cross reference to those virus diseases which may be suspected of attacking a particular plant. A complete glossary of the technical terms used makes the book useful to the amateur as well as the professional horticulturist. In a subject which depends so largely on descriptive powers, it is especially pleasing to find a book so lavishly illustrated with excellent photographs. It is to be hoped that this book will be as widely read in New Zealand as its excellence deserves.

Published by the Department of Scientific and Industrial Research.

HORTICULTURAL ABSTRACTS

Published by Commonwealth Agricultural Bureau, England.

One hestitates to endeavour to review a publication such as this, but it is undoubtedly worth bringing to the attention of all members. Compiled by the Staff of the Commonwealth Bureau of Horticulture and Plantation Crops, the publication contains abstracts of every worthwhile horticultural article which appears anywhere in the world. Thus it gives reference to all the written horticultural knowledge available. and so forms the starting point for anyone wishing to carry out a full investigation into any subject.

In addition to the abstracts, the indexing system is excellent, and provides easy cross reference on any subject. Students, research workers, advisory officers, specialist growers, and others who have access to copies should use them. It is hardly the book which the home gardener is likely to find worth purchasing at the price of 50/- per annum.

Even if increased use of library copies does not help the Bureau's financial problems it will at least make stimulating reading and information.

CAMELLIAS AND pH

Soil pH has frequently been considered to have an important bearing on the growth of Camellia plants. and horticulturists are usually advised to take special steps to acidify the soil in which these shrubs are to be planted. Research work by Kimborough and Hanchey at Louisana, U.S.A. has shown that Camellias will grow well over a wide range of soil pH, and that no advantage was gained from acidifying the soil. Camellias often grow profusely in areas where acid soil occurs naturally, but the explanation for this may lie rather more in climate than in pH. These plants certainly flourish in soils with relatively cool moist growing conditions rather than hot and dry seasons and liberal moisture supplies may well be the answer.

[Proceedings of the American Society for Horticural Science. Voy. 65. 1955.]

In This Issue . . .

14th International Horticultural Congress

Some observations by K. C. Hocking N.D.H. (N.Z.), F.R.I.N. (N.Z.), Head Horticultural Department, Massey Agricultural College

The College Council granted me Refresher Leave during 1951 to travel in the United Kingdom, Europe and Australia to see for myself the horticultural activities in the teaching, research and production field. One of my reasons for asking for leave during this period was the fact that it was the year in which the 14th International Horticultural Congress was to be held in Holland.

The Congress is a gathering of Horticulturists from all parts of the world at which papers are read and discussions take place on all phases of horticultural activities. These papers are mainly of a scientific nature and cover all the sciences as applied to horticulture. The first conference was held in Belgium in 1864, lasted three days and was attended by some 485 members representing 13 countries. Since that first one there have been 12 other International Congresses, some worthy of the name International and some doubtful. All congresses before the first World War were held in Belgium or France. Since the Amsterdam Congress in 1923 this rule was definitely broken. Congresses tend to be held every three years. but this too was broken during the second World War. The last one was held in England in 1952 and the next will be held in 1958, the sponsoring country being France and the tentative choice of place Morocco. The word tentative is used because many changes could take place by 1958, but in any case France will be the host country. It would be very delightful to attend the next Conference if it were held in the South of France.

There is no permanent bureau and no permanent staff associated with these horticultural Congresses. Shortly after the 1923 Congress the International Committee for Horticultural Congresses was formed and has since acted as a link between consecutive congresses. Delegates from Austria, Belgium. Germany, Great Britain, Hungary, The Netherlands, Norway, Poland and Switzerland were the first members. New Zealand is now a member of this Committee, Mr. A. M. W. Grieg, being the permanent representative. Owing to the fact that he could not be present last year he nominated me to act on the Committee on his behalf. This position gave me certain privileges and also certain responsibilities denied to ordinary members. The most notable privileges were social ones, in that at all social functions I found myself at the head table, as it were, and was required to make the odd speech. The most outstanding privilege was, of course. an audience granted by Her Majesty, Queen Juliana, to the members of the Committee. We were very graciously and informally received by Her Majesty at her Palace and each member had the opportunity of speaking to her for some minutes.

There has been a tendency over the years at these Congresses to switch from the more practical to the more scientific subjects. There are at least two good reasons for this. The first is the establishment of separate organisations and separate Congresses for the more practical and also for economic subjects, and the second the enormous growth of horticultural sciences.

The 14th Congress was attended by some 800 odd delegates from 56 separate countries, Argentina, China, Bulgaria, Finland, Japan, Malaya, Hungary, Greece, Peru, Nigeria, Syria, Turkey, Uruguay and the U.S.S.R. were some of the countries represented and there were of course, large contingents from The Netherlands, the United Kingdom, the United States of America, France and Germany. To cope with such large numbers and such widely differing branches of horticulture the Congress proceedings were divided according to the branches of horticulture and five wide divisions were made, namely: vegetable and seed growing, fruitgrowing (less tropical and sub-tropical fruitgrowing), floriculture and bulbgrowing, arboriculture and tropical and sub-tropical horticulture. Then five main topics were discussed in these sections, namely: breeding and diseases and pests; environment; and horticultural machinery and technology. Five sessions were planned for each section. The advantage of this programme is that, for instance, the fruitgrower can stick to his section, the breeder or the pathologist can visit different sectons on consecutive days where the subject of his interest is under discussion. Personally I found that because there were such a large number of interesting subjects it was difficult to decide just which to attend. Furthermore, because even these discussions did not cover all aspects, a number of symposia, in which combinations of topics were discussed, were included. In addition four general lectures were given by speakers on subjects of general interest. Professor Wellensiek spoke on the Past. the Present and the Future of horticultural Congresses. Dr. Cullinan of the U.S.A., spoke on Current trends in Horticultural Research in the U.S.A., Professor Chouard of France spoke on the role played by temperature in Horticulture and Dr. F. R. Tubbs of East Malling on "the control of growth and reproduction in perennial plants". Finally a series of 20 excursions were available, on seven separate days. Of these, two only were what might be called tourist sightseeing excursions, the remainder being specific and technical interest. Here again it was difficult to make a choice as obviously only seven excursions could be undertaken and there were 20 to choose from.

The excursion that aroused the greatest enthusiasm was the Aalsmeer Flower Parade and Stadium Play. Aalsmeer is, of course well known as the centre of flower production in Holland. It was held in the Amsterdam Stadium and was aptly described as a Festival of Fowers and Music. Each year Aasmeer stages a flower festival to show is wealth of flowers, mainly per medium of decorated floats and cars. Each entry is emblematical. The official programme stated "This year the device 'Sound and Colour' deals with music. In the stadium famous composers will be introduced by means of moving emblematical cars: Mozart, Schubert, Beethoven, Stravinsky and many others get their share of a grand floral tribute and form the subject of a play of dancing, flowers, music and youth. Remember the flower is the best Ambassador of Peace."

Twenty five tractor drawn decorated floats and twenty five cars took part in the procession which surrounded an arena on which traditional dancing was proceeding. The wealth of colour and intricacy of design of millions of flowers was beyond description.

As a generalisation of horticulture in Holland one gained the immediate impression of an extremely intensive utilisation of all available land and a neatness and degree of maintenance that was beyond anything I have experienced elsewhere. Every available piece of suitable land was utilised. For example, areas of swampy land that apparently could not be drained were planted with willows which were cut periodically and used to manufacture baskets and containers in which horticultural produce, such as nursery stock, was marketed.

One other characteristic of the Horticultural Industry in Holland is the effort of the producers to help themselves. This is well illustrated with the nursery trade. The nursery industry centralised on the town of Boskoop covers 1400 acres, with 670 holdings. One quarter of this area

is taken up with canals and all houses and nurseries are virtually islands. Here all ornamental plants with the exception of street and fruit trees are grown. 90 per cent. of the production is exported to a total value of 18 million guilders (£1.8 million). There is an Experimental Station in this area which was founded by nurserymen. Growers pay a levy to maintain this research station of 2.5 guilders (5/0) plus 5 cents per 10 square feet of nursery space. This levy is subsidised by the Government. The Director of this station is also the Chief Adviser and he has a staff of assistants who give advice to growers as well as carry out experimental and teaching work. It would appear to me that if a producer pays for a service he is much more likely to make use of that service.

This example is characteristic of what occurs in horticulture in the "help yourself" policy.

Vocational Training

The present comprehensive vocational training is a direct result of the severe agricultural depression (1878-1895) when a State Commission was set up to review the position and recommend that, of necessity, technical training must be given to workers on the land. The development of this educational policy makes fascinating reading. Progress has been so sure and steady that within a few years most of those earning their living in horticulture, whether as employer or employee, have had some form of organised horticultural instruction. No one may become a landowner unless they have had a suitable technical training. In this way it is hoped that the industry will be better fitted to adapt itself to ever-absorbing conditions and continue to make an important contribution to the nation's economy. Briefly the training is as follows:—

General Horticultural Courses

These courses give the most elementary type of training whereby thousands of employees have learnt the principles underlying their work, the curriculum being based on the specialist needs of the district. Classes extend over two years and may be held on three or four evenings per week. Thus an employee who may be of any age puts in some 150 hours at evening school per year. 7,000 horticulture employees attended some 400 courses in 1952. These courses are run by teachers of school for general education, who have attended special courses in horticulture and have obtained diplomas for teaching this subject. These schoolmasters not only teach general subjects in the day and horticultural subjects at night but they also visit their pupils at home and maintain a close liaison between teaching and practice.

Elementary Horticultural Schools

These are in effect part time or day release schools. The pupils are young horticultural workers who enter the Elementary Horticultural Schools on leaving the ordinary elementary school at about 13 years of age. They complete their statutory educational requirements whilst engaged in vocational training. This is a four year course, 2½ days a week at school and the remainder on the land.

Secondary Horticultural Schools

These are designed for students 15-16 years of age, who have had a general education to this age and have had one year's full time practical. Sound theoretical training in the basic sciences is given, further general education continues and the specialist line of a particular district is thoroughly taught.

University Education

This is taken at the University of Wageningen and students wishing to study Horticulture enter the University from one of the secondary schools for general education. The course is one of six years and is roughly equivalent to a Masterate degree in England or New Zealand.

This has perhaps oversimplified the horticultural education position but it illustrates the diverse nature of educational facilities available in Holland. Whether or not we could with advantage incorporate some of these ideas into New Zealand is a matter for argument but I think few will argue about the necessity for horticultural education.

Review of Papers Presented: (Current trends in Research in U.S.A.)

The control of plant diseases by antibiotics is encouraging. particu- antibiotics is encouraging particularly of bacterial diseases of fruit and vegetables. Control of fungus diseases in the greenhouse appears promising enough to suggest ultimate control even of virus diseases.

A new tool of the last decade (the atomic age) is being used for the study of plant nutrition in use of radioactive chemicals to trace absorption, translocation and utilisation of nutrient elements by plants. Gamma radiation has been used to modify plant growth and prolong storage life of vegetables.

Recently there has been developed an entirely new concept of the way light controls responses such as regulation of flowering, germination of light-sensitive seeds and co-ordinated growth of seedlings. All these phenomena are now known to be under the control of a single photoreversible light reaction.

Breeding for disease resistance

Some of the problems associated with this work were discussed and suitable techniques suggested. It would appear to the uninitiated that there is a race between the plant breeder in his work to develop resistance and the phytopathologist to produce suitable chemical methods of control.

Artificial Water supply in Horticulculture

Controversy has existed for many years around the question whether the so-called "available moisture" is equally available for plant growth or available only with such increasing difficulty that plant growth functions are retarded before the wilting point is reached. The various theories and suggestions covering this question were discussed in a sympoium entitled "Artificial Water Supply in Horticulture". The author gave two tables, one listing those conditions lowering probable yield which will be increased by irrigation at relatively low soil moisture stresses and the other conditions where yields will be increased by avoiding relatively high soil moisture stresses.

Mist Spraying and disease Control

This system of spraying is popular in New Zealand and is generally known as semi-concentrate spraying. The author states: "At the present stage the spraying machine can be designed to produce any form of required deposit but the choice of deposit to give control is in the realms of the biologist . . . The use of the small volume sprayer in orchards will depend very largely on the satisfactory evolution of insecticides that are not too toxic to humans in conjunction with the evolution of fungicides that can be economically prepared in solution or in a colloidal state in a relatively concentrated form and which are compatible one with another.

THE INFLUENCE OF ARTIFICIALLY CREATED CLIMATICAL CONDITIOINS IN HORTICULTURE

1. Influence of Storage Temperature and other factors on forcing of Easter Lilies, Iris and Tulips

Easter Lilies

Freshly harvested mature bulbs in air dry peat within bags of polyetheylene plastic and subjected to 6 weeks at 7 degrees — 10 degrees C. results in longer storage life, a larger number of flowers per plant and fewer days from planting to blooming than other storage method tested.

Wedgewood Iris blooming is accelerated by heat-curing mature bulbs for 10 days at 32 degrees C. followed by storage for 3 weeks at 18 degrees C. and then 6 weeks at 8 degrees at 10 degrees C.

Tulips

Stem length of forced tulips is related to temperature and length of storage of the bulbs prior to forcing. Pre-cooling bulbs of some varieties at temperatures lower than 9 deegrees — 10 deegrees for 6 weeks followed by planting and storage for 6 weeks at 10 degrees gave longer stems and earlier flowering in the glasshouse than storage at 10 degrees for 12 weeks.

2. Spreading the Flowering time of Forcing shrubs by Cold Treatment

By retardation and acceleration flowering shrubs such as lilacs, Prunus tribola. P. serrulata, Forsythia and Viburnum can be made to bloom over a much longer time than is normal. The following is an example. By storing lilacs from the middle of February (Holland) for 6 months at a temperature of —2 degrees C. flowers could be retarded until September with a better quality than that of early forced lilacs.

With Forsythia a cold treatment can be applied to cut branches and so result in early flowering of these branches after treatment. This method has become so popular at Aalsmeer that in the autumn of 1954 as many as 150,000 treated branches were sold.

Gravel Culture

While soils culture has been known for some years the use of sterile gravel of chip size ¼in. is not so well known. Its use is assuming some prominence in England and elsewhere and this was discussed at some length. One paper gave the results of a grower of carnations together with the formula used in the solution.

The Distribution of Virus-Free Plant Material

Virus free plant material is now available for strawberries and raspberries. The production of virus free rootstocks of fruit trees has been started and mother trees of cherry varieties already made available to nurserymen This work is being extended to include plums, apples and pears (East Malling Research Station).

A quick and objective diagnosis for viruses is made possible by serological methods. By injecting animals with suspensions of plant viruses antisera are procured that can serve as a specific reagent in vitro for a given virus. Different microtechniques have been worked out to test plants serologically for the presence of virus. Specific antisera have been prepared against different viruses attacking potatoes. Hyacinths, Tulips, Daffodils, Irises, Freesias, Carnations, Sugar Beet and other horticultural and agricultural crops. (Laboratory for Bulb Research, Lisse, Netherlands)

The Rose

Control of Powdery Mildew, Rust and Black Spot diseases of Roses in U.S.A. Climatic conditions such as temperature and humidity have a large influence on the occurence of these diseases. Powdery mildew spores germinate in the absence of water but require high humidity 97-99 per cent. whereas rust and black spot spores must have contact with water to germinate. Temperature for the development of powdery mildew is 64-75 degrees F., for rust 64-70 degrees and black spot 75 degrees F.

Fungicides recommended are: Powdery mildew—sulphurs, Karathane and Mildex (dinitro capryl phenyl crotonate); Rust—sulphur and ferric dimethyl-dithio carbonate ferbam either together or separate, applied at periods of wet foliage. Black Spot, either sulphur or captan. Coverage either before or just after rainy periods is necessary.

Some techniques used in the Breeding of Vegetables crops in the U.S.A.

The first requirement for any plant breeder is to bring his parental plants into blossom at the desired time in order that new combinations of germ plasm might be affected. Some of the techniques that have been found to hasten flowering are, proper photoperiod adjustment, training plants in supright positions, girdling grafting, applying chemical and hormone sprays, altering nutritional balance, controlling rest period and temperature and by pollen storage.

Water Regimes in Irrigation Research

In a series of experiments it was shown that tomatoes give a striking response to different water regimes, growing and yielding best in the wetter regimes, while lettuce on the other hand, have grown equally well under a variety of water regimes.

Temperature effects on early growth and development in Tomatoes

Commencing from the germinating seeds the progress of the young tomato plant is punctuated by thermophases during which the temperature determines the subsequent development of the plant in the following ways. (1) Production of the "Rogue" character; (2) Determination of the Inflorescence position; (3) Size of infloresence or degree of branching. The knowledge of the existence of these thermophases and the ability to control temperature accurately in glasshouses should lead to greater profitability in the commercial production of the tomato.

Steam sterilisation of glasshouse soils

Efficiency in the use of fuel is important and research has shown how fuel may be saved by—(1) sterilise soil in dry condition; (2) Boiler output must be delivered to suitable area of soil. A boiler of capacity of 1000 lbs. of steam per hour should sterilise 60 sq. ft. of soil at a time; (3) Reduce steam loss by covering soil with polyethylene sheet, not sacks.

Apple Scab Resistance

A number of Asiatic Malus species have field immunity to "Black Spot". The genes carrying this resistance are being incorporated into the major apple variety types by a breeding programme with some success.

The Production of Bud Sports on Apples through the use of Artificial Radiation

By using X-rays and thermal neutrons promising results have been secured in the Cortland variety in both sectorial and complete red sports.

Weed Sprays as a substitute for cultivation in California Orchards

Herbicides rather than cultivation have been used in California in an increasing scale for 40 years. 100,000 acres are now handled in this way.

Ringspot Virus Disease of Raspberries

Outbreaks of lethal leaf curling diseases of raspberries apparently endemic to eastern Scotland are caused by a virus of which no vector has been discovered, but plants become infected through their roots. There is strong evidence to suggest this virus is soil borne.

Propagation of Lilies

Of the 85 species in the genus Lilium 30 species and many hybrid seedlings have been increased by propagation from scales. Scales placed on moist sand and covered with an inch of sphagnum moss, gave better results than those planted an inch or two deep. High temperatures (30 degrees — 35 degrees C.) during the early stage of callus and bulblet formation were more effective than lower temperatures. Scales were protected from rotting by dusting with Arasan or Fermate.

Some Factors affecting Flower Bud Development of Chysanthemums

Year-round flowering schedule for Chrysanthemums is now possible. This is also the case with hyacinths and other bulbs.

An evaluation of the mist technique for the rooting of cuttings as used experimentally and commercially in America

A comparison of the use of continuous and intermittent mist is presented and devices for controlling the intermittent mist such as timing devices and the electronic leaf were described. The physiological responses under mist were discussed.

The History of vegetative propagation in Britain

This was a useful survey of propagation methods through the ages.

The use of Agri-mycin in the control of fire blight on ornamental plants

The use of Terramycin and streptomycin on rosaceous plants was reviewed and the success secured has been a particularly welcome development in Horticulture.

Breeding of apples with low chilling requirements

A breeding programme was started in 1939 with the aim of making it possible to grow apples under subtropical conditions. Four varieties have been released commercially.

The foregoing summaries are only a very few of the many papers presented and represent only those that I considered were of importance and that could be given in the limited time available.

Full copies of the papers will be available shortly when the proceedings are published.

The Indigenous Grasslands of New Zealand and their Plants of Horticultural Importance

BANKS MEMORIAL LECTURE, 1955

(By Professor L. W. McCaskill)

GIVEN a free hand in the choice of the Banks Lecture for 1951, I chose the present subject for various reasons.

Considering our visitors from the north, it seemed appropriate to discuss something which is peculiarly South Island in nature. Then those vast grasslands were the basis of the early and successful settlement of the South Island provinces. On them, whether by direct grazing or as the result of the plough, there was produced in the early days much of the capital used in the development of the North Island. They have always continued to play an important part in our economy; their perpetuation in a healthy state is vital to our present systems of farm management, to the conservation of water for hydro-electricity and irrigation, and to the control of the rivers down the whole eastern slope of the island. Also, and perhaps of most immediate concern to the present audience, they contain many plants of great botanical and horticultural interest, some of them of world-wide renown.

Sir Joseph Banks was both a botanist and a horticulturist. In addition he was deeply interested in the economic applications of both. It would seem appropriate then that a lecture delivered in honour of his memory should be given on a subject which illustrates so well his versatile interests.

The vegetation of primeval New Zealand from sea-level to something over 4000 feet consisted mainly of two great plant-formations—forest and grassland—the former dominant in the North Island and the latter with its main area in the South Island.

In the North Island the tussocks covered about 650,000 acres (2.3 per cent. of the area) all on the central plateau. The area in the South Island was originally about 17,000,000 acres. Today we still have 13,000,000 acres (34 per cent. of the total area) distributed on the eastern side of the Alps from the Wairau River in the north to Southland.

It is now largely confined to the unploughable slopes, as the plains and downland have been converted, either to permanent pastures of English grasses and clovers, or to arable farming.

This 13,000,000 acres has been grazed for one hundred years by millions of sheep and thousands of cattle; the tussocks have been frequently burned; rabbits have infested them in uncounted millions; large numbers of exotic plants have forced an entry and successfully established themselves; and yet superficially the grasslands appear much as they appeared in 1850. As Cockayne says in "New Zealand Plants and Their Story": "This speaks volumes as to the suitability of the tussock growth-form for its New Zealand environment. With a list of enemies arrayed against it, the tussock still stands supreme, except in the lowlands where it has fallen before the plough or in Central Otago with the dry climate and man arrayed against it."

Tussocks are able to grow successfully on a wide range of soils; we find them to all external appearances the same whether on the schist soils of Otago, the greywacke gravels of Canterbury, limestone areas, volcanic soils or loess deposits. They also occur on coastal and inland sand dunes.

The low tussock-grassland formation also is found in a wide range of climates and has much the same composition and structure whether the rainfall is 100 inches or whether it is ten. But in general the main climatic factor is one of dryness, whether this dryness arises from low rainfall, as in Central Otago, or from the high rainfall being offset by porosity of the soil accompanied by the evaporative power of constant dry winds.

Snow may lie for three to six weeks at a time in the mountain areas in winter, the period decreasing with decreasing altitude and being much shorter on the sunny faces. Although there may be up to 200 ground frosts in a year and frosts may be severe, they rarely injure the vegetation directly. However, the effects of frost lift of soil followed by wind erosion may be very harmful to plants, especially seedlings.

The mesophytes which grow in the microclimate provided in the shelter of the tussocks were, in a virgin state, largely independent of the external climatic extremes. Destrustion of depletion of the tussock has altered this microclimate to such an extent over wide areas that many species have disappeared. (This disappearance has often been hastened by their palatability making them attractive to stock. Angelica montana is an outstanding example of this.) It is now generally accepted that any successful large-scale attempt at regeneration of depleted tussock-grassland must be based primarily on the return of the tussock itself as the essential factor in restoring the necessary micro-climate

at ground level. The tussock-grasslands may be classified in various ways but fundamentally there are two distinct types. The first, which we know as Low Tussock-grassland, is characterised by the dominance of one or the other of the small tussocks Poa caespitosa and Festucs novaezelandiae; the second, where the dominant species is one of the large Danthonia species, is known as Tall Tussock-grassland.

The low tussock-grassland can usually be divided into the Poa or silver tussock association, commonest at low levels and on the more fertile soils; and the Festuca or hard tussock association found in the tougher and less fertile areas especially in the interior and up to 4000 feet. (Altitudinal limits mentioned, refer only to the plant-formation, not the individual plants because many of these, having joined other associations, ascend into the alpine belt.) That fertility is one of the main factors in determining the dominance or otherwise of Festuca is shown by the way that Poa caespitosa comes in on slip debris, road fill and flood deposits, even in what would normally be considered fescue country.

The individual species in the various associations will be discussed when shown on the screen, but they comprise a mixture of shrubs, grasses, sedges, semi-woody plants and herbaceous species, many of them small and insignificant in appearance but nevertheless of great importance in the general plant cover. Some species are confined to the lowlands, some to the montane areas but the transition from one belt to another—and this applies to higher transitions too—is so gradual, and the plants in common are so numerous, that it is difficult to draw a clear-cut line.

Tall tussock-grassland is characterised by the dominance of either Danthonia flavescens (or snow-grass) or Danthonia rubra (or red-tussock). Red-tussock is found on the Southland plain (where it is now largely converted to pastures carrying phenomenal numbers per acre of Romney ewes producing the highest quality "Canterbury" lamb) on Stewart Island and the wetter and sourer parts of the lower montane belt of the South Island. Snow-grass associations are found on the South Island mountains between 2000 and 6000 feet and from the soil erosion, water conservation and river control point of view are of vital importance. The recent report of the Tussock-grassland Committee stresses the lack of knowledge of the snow-grass associations and quotes Cockayne in this connection: "It is hopeless to really understand the ecology of a community until the taxonomic status of its members is understood, a matter almost invariably neglected by plant ecologists." (Another point of fundamental importance that may be inserted here is that the present parlous condition of the snow-grass country is due partly to the fact that, apart from Celmisia spectabilis, no native or exotic plant seems able to colonise the bare ground as the tussocks deteriorate.)

Let us now approach an area of grassland, say, low tussock-grassland, and remember, as we study it, Cockayne's summary of the scene.

"This plant formation is exceedingly uniform in physiognomy, no matter what its altitudinal position. When viewed from a distance, the growth appears clothed with a yellow carpet, so smooth and even as to give the impression that all litter had been swept away with some giant broom. Here and there on the hillsides are dimples on its surface marking gullies or depressions. Such apparent smoothness is quite deceptive. Multitudes of tussocks stand everywhere, either close and touching or with spaces between. Here and there are solitary specimens or clumps of Cordyline australis or Phormium tenax. Dark-coloured bushes of Disearia toumatou may be dotted about and species of Carmichaelia, their green, erect leafless stems three feet high, are not uncommon. Small herbs and prostrate or low-growing shrub occupy the spaces between the tussocks."

To get some idea of the life-history of this formation we need only visit a shingle river-bed in the mountains of Canterbury. We will find that the river is not normally confined to one stream but rather that several streams wander over a wide stony bed most of which will be dry enough to invite plant colonists. The first to appear are some of the Epilobiums especially E. melanocaulon. Also arriving quite early are species of Raoulia. These may grow rapidly into large moss-like patches or cushions, very close to the ground and thus undisturbed by the constant winds. These Raoulias are of supreme importance in the tussock grassland story. They represent here the first stage in colonization of bare ground and later we will see them as the last stage in retrogressive succession. "They stand between a bare, desert-like erodible soil surface and a covering that can progressively develop to hold the soil and ultimately provide shelter for the innumerable herbs and grasses that constitute the major grazing potential of the lowland and montane tussock formations." Lichens, mainly dark-grey in colour, creep over the stones to be soon accompanied byb drought-resistant mosses. Gradually wind-borne silt is trapped by the Raoulias. A small Muehlenbeckia and two kinds of Acaena gain a footing and creep across the inhospitable surface. With increasing stability of the ground two or three Carmichaelias join the association and other plants likely to be seen are Oxalis corniculata, Geranium sessiliflorum and Leucopogon fraseri. As leaves and stems die and form humus and more silt is trapped, fertility gradually increases and tussock grasses establish.

By degrees other plants will come in and according to the edaphic conditions will form a more

or less persistent association. In one place we may get a Discaria thicket; elsewhere Pteridium, Cordyline or Phormium may be the main plant.

But over the greatest portion of the area the ultimate association will be the typical tussock-grass land. Certain insects would enter the association, ants living under stones; caterpillars, and grasshoppers feeding on roots, stems and leaves. Native birds such as dotterel, quail and pipit would make the area a feeding ground and nesting site. But there were no grazing animals —not even rodents. This description applies mainly to the shingly areas on riverbed and plain, to the shingle fans of the mountains, to the shores of certain lakes and to gravelly ground almost anywhere; but judging from what happens in the regeneration of depleted areas it is probable that from a similar process the grassland covering of other areas resulted.

In this primeval state, plant, bird and insect would live in a system, more or less balanced. Because of the additional suppplies of humus provided by the decay of both plants and animal, fertility would tend to rise rather than fall. Soil formation more than kept pace with the processes of denudation.

After countless years of life and growth, death and decay of the various plants comprising these grasslands, there had developed what has been termed "a brown, dead quilt of rotting vegetation." To provide green succulent feed for his sheep the settled would visit his vast leasehold area some months before he intended to stock it, "burn his mountains charcoal black" and return later to liberate his Merinos on the new, green vegetation which had by then been produced. Unfortunately what might have appeared to be good practice once or twice and under special conditions, came to be considered good annual practice everywhere, whether the rainfall was 12 inches or 60 inches, whether the wind was blowing or not, whether frost lift was severe or otherwise.

It was in the more arid areas of Central Otago that the harmful effects of regular burning first became evident. As long ago as 1868 Buchanan wrote: "Nothing can show greater ignorance of grass conservation than the repeated burning of the pasture in arid districts which is so frequently practised. The finer species of grass, having fine roots ramifying near the surface, are either destroyed by fire or afterwards by sun and frost while the coarser tussock grasses, spear grass and many plants worthless as pasture, having large succulent roots, strike deep in the soil and are preserved. Much of the grassland of Otago has been thus deteriorated by fire and it is no wonder that many of the runs require eight acres to feed a sheep. It is fallacy to suppose that grass country requires repeated burning to clear the surface of the excess of plants as the old and withered grass forms shelter to the young shoots, protecting them from parching winds, sun and frosts." Those words are truer even today.

Over the country burning has had different effects according to the climate, soil conditions, system of management and degree of stocking. In some places it has resulted in a general weakening of the tussocks, exposure of the smaller plants to drying wind and sun, reduction of humus and a lowering of fertility. Where overstocking was practised as well, the vegetation might soon be so reduced that the soil lost its cover, was exposed to the action of sun, frost, wind and rain, and regeneration of any plants made extremely difficult.

In some areas, as a result of burning, other indigenous plants replaced the original vegetation often in the form of pure associations covering wide areas. Danthohnia pilosa was apparently a rare plant in the original grassland occurring only when there was maximum light at the ground surface such as the edges of rocks or on light stony ground. Burning and grazing by reducing the shade-producing cover, provided maximum light conditions ideal for the spread of Danthonia. In many places it produces a turf so dense that even brown top, sweet vernal and Poa pratensis are excluded.

Celmisia spectabilis or cotton plant has its leaf buds surrounded by woolly leaf sheaths which nearly always contain much moisture. Consequently they are extremely resistant to fire. Even though the tops are scorched, regrowth is rapid, flowering and seeding is quickly completed, seedlings thrive in the bared soil and in a few years the open cushions of Celmisia replace the tussock, sometimes completely. Other Celmisias behave similarly, notably C. coriacea in Southland and C. dubia in Nelson.

Bulbinella hookerii has a tuberous root and summer-green habit which render it largely immune to fire. QQuite unpalatable to stock and seeding freely in the bare ground, it has taken charge of thousands of acres of hill country, notably in Central Otago.

It is in the snow grass associations at higher altitudes that burning has had some of its most serious effects.

The recently published report of the Tussock Grassland Committee has this to say: "The effects of fire are abrupt and devastating. The soil surface loses its protection of living and dead leaves and bare ground increases from nil to as much as 70 or 80 per cent. On steep slopes, debris accumulating above a snow tussock finally overwhelms it, making the next tussock in the path of the debris more vulnerable. Burned snow tussock stumps make insufficently rapid growth to protect the soil surface. The effects of aridity induced by the bare surface, instability of the soil mantle, and possibly also reduced fertility of residual subsoil when erosion has removed the upper horizons, all combine further to weaken the

tussocks and to reduce the prospects of establishment of seedlings of any species."

The Committee considers that the nature and extent of the flood control works in the lower reaches of the rivers that drain the Southern Alps is directly dependent on the stability of the Kaikoura soils and the well-being of the cover of snow tussock. "Irrespective of any improvements that can be effected in pasture management for the low-altitude fescue-tussock and silver-tussock grasslands, the battle for control of east coast rivers will be won or lost in the high-altitude snow-tussock grassland."

The Soil Conservation and Rivers Control Act 1941 and the powers it confers on Catchment Boards to control burning of tussock are being gradually implemented in close co-operation with the Lands Department, but too many fires are still being lighted for one to be happy about the future of both the tussock-grasslands and the soils on which they grow.

So far no mention has been made of the rabbit. This was intentional. Depletion of large areas of tussock-grassland has occurred in the absence of the rabbit and I do not consider the rabbit a primary cause of depletion. Nowhere does it appear to thrive and increase in areas of dense vegetation such as healthy unburned tussock. But once it was provided, by burning, with bare ground and succulent young leaves it increased at a rate which can be expressed only in astronomical figures.

There developed intense competition between rabbit and sheep and as the supply of food became insufficient, the devastated areas ascended higher and higher up the hillsides. After a few years the scene was changed beyond recogntion. Listen to Leonard Cockayne's description of the scene in Otago.

"Instead of a close array of tussocks there is a man-made desert. With the tussocks are likewise gone nearly all the members of the ancient grassland. Viewed from a distance the mountains resemble giant sand-dunes. A close view shows, however, on sunny slopes, a surface of bare, hard soil in places destitute of all visible plant life except on rocks, but usually having growing upon it that hall-mark of the rabbit, the hard, flat silvery cushions or mats of Raoulia lutescens which are frequently three feet or more in diameter. . . . Where conditions are slightly more favourable perhaps a dozen or more species are present, most of which would be either absent or rare in the original grassland. Where there is rather more rain, various species of Acaena are in extreme abundance and on the less sunny slopes, Bulbinella hookeri in great quantity—an unexpected species which usually grows in very wet ground."

The native grasses were destroyed over wide areas and sheep died of starvation in hundreds of thousands. After the first panic we gradually settled down by 1900 to accept the rabbit and all the harm he did mainly because of the value attached to his skin and his carcase. We remained unmindful of the damage he was doing to our indigenous grasslands and our basic asset the soil and the loss he was causing to our national income. If we examine the value of our rabbit sales overseas since 1886, when rabbit skins and carcases were first exported, we find that the total overseas income from rabbits in 77 years was less than £21,000,000. It can be shown that the loss of overseas revenue **annually** because of the ravages of rabbits is, at present-day values, at least £15,000,000. The damage to the grasslands and the soil is impossible to assess.

Thanks to the setting up of the Rabbit Destruction Council in 1947 and its unremitting determination to implement a killer policy the end of the rabbit as a pest is in sight. We should not relinquish the pressure until every rabbit has been killed. Attempts at the improvement of our indigenous grasslands will be largely a waste of time unless the rabbit is exterminated. As so often happens the relief of one problem may bring others in its train. The destruction of the rabbit in many areas has been followed by a serious infestation of serious weeds of which sweet brier is an outstanding example. Brier has been present all the time but rabbits have kept the seedlings in check. In these areas we must be prepared to follow up rabbit destruction with a programme of weed control.

Nor did I mention the insect as a factor in depletion. Investigation of tussock country at almost any time of the year will reveal insects of various kinds feeding on the leaves, stems or roots of the tussocks themselves or the associated plants. These insects are all natives and have probably always lived in close association with the tussock grasslands. In the virgin state they would be kept in check by climatic conditions and the attacks of insectivorous birds. Man's occupation by altering the natural conditions has so upset the original balance that some of these insects at times reach colossal numbers with detrimental effects on the plant life. Any future investigation of tussock regeneration must include the insect problems and also the place of the insectivorous bird in its control.

So much for the past and the present. What then of the future- The question we have to ask and try to answer is: "Can these millions of acres continue to be occupied effectively without damage continuing to the soil and vegetation?

I do not propose to attempt to assess the economic return from the tussock-grasslands, particularly the ten million acres we normally think of as the high-country. I will merely point out that they carry some two million sheep which produce some fourteen or fifteen million pounds per annum of the valuable Merino, half-bred or Corriedale wool; that they produce store sheep and cast-for-age ewes which play an integral part in the present scheme of farming on the low country; and that the present occupance places on the occupier the onus of controlling fire, noxious animals and weeds which otherwise become the job of the State.

I believe it highly desirable that the high-country should be kept in occupation and I think the already benevolent State could go further even than it has done recently in making concessions to help that special "breed" of high-countryman which alone can successfully handle the problems to be faced.

But the effects of continued occupance of any particular area must be weighed against the problems of soil erosion and water conservation. And having weighed them, I am optimistic enough to believe that we can find the answers which will enable us to use the grasslands as a productive asset at the same time as we hold water and soil and protect the lowlands.

But we'll have to do better than we have done in the past. The story of piecemeal and sporadic attempts at research over the last 45 years is a sorry one and has been fully aired at various times, so I will not go into it here. The fundamental weakness has been that no single authority was ever set up to carry out the work and no Government Department or other organisation was prepared to assume the responsibility. Recent developments, however, are encouraging. Only last November the Soil Conservation and Rivers Control Council instructed its Soil Conservation Committee "to take the necessary action to organise, undertake and co-ordinate tussock-grassland research." At a conference last month at Kurow and Omarama the South Island Catchment Boards agreed to support the Committee and the Soil Council in its aims. The Boards drew up a research programme which they considered necessary to find the answers. A satisfactory solution was considered to be basic to keeping the high country in occupation in the interests of production and soil and water conservation.

The job of the Committee is to weld together the diffuse efforts of the Departments of Lands, Scientific and Industrial Research, and Agriculture; the Soil Conservation Council and the Catchment Boards; the High Country Committee of Federated Farmers and Canterbury Agricultural College, into a concerted long-term programme of research, investigation and demonstration. I believe that the aeroplane will eventually play a very important part in the rehabilitation of these grasslands. It has done a major job in

the control of the rabbit and pioneer farmers have already done wonders with sowing and top-dressing from the air. I will show you some of these results on the screen.

The most difficult part is yet to come. The research plan has to be put into operation and in such a way that it receives the support and confidence of the high-country man himself.

We spend one million pounds a year on rabbit control and in itself it is an excellent investment. But it would be a calamity if the defeat of the rabbit were not followed up by measures that will ensure increased production of meat and wool at the same time as the soil and its water-holding capacity are preserved. As mentioned previously, one interesting feature of the control of the rabbit is that it is often followed by the phenomenal increase of noxious weeds, notably sweet brier. The research programme must pay due attention to this problem too.

May I in concluding this portion of my address refer to the botanical aspect again.

We have today honoured the head of the Botany Division of the Department of Scientific and Industrial Research, an organisation recently transferred from Wellington to Christchurch. I had hoped that with its establishment here in a strategic position as regards the location of the indigenous grasslands, with all the advantages of close association with Canterbury College and the Botanic Gardens, it might play an important part in the solution of the fundamental botanical problems basic to a solution of the practical problems which face us. I believe a separate Botany Division in New Zealand a necessity. I hope that the Ministerial announcement of its coming transfer to Lincoln does not mean loss of identity and possible diversion from its fundamental job.

Perhaps I have spent too much time on historical and economic matters. I thought it was necessary to enlarge on them to enable you to understand the more fully the slides I will show you.

Samuel Butler, in his early comments on Canterbury, did not know "of one pretty flower which belonged to the plains" and was disgusted by a "very stupid white gentian." Closer acquainance and a little horticultural experience I am sure would have changed his opinions. Many of the plants associated with the tussocks at lower levels do surprisingly well even in our Christchurch climate (after all, that's what Nature designed them for) and though not large and colourful and showy they nevertheless have their charm and interest. Some of the plants from the higher altitudes are among the world's best.

I propose now to show you on the screen some of the plants growing under natural conditions and in cultivation.

I attach to this paper a list of most of the plants which I consider have horticultural importance. Those specially marked should be avoided at all costs. They can become the worst of horticultural weeds.

LIST OF PLANTS OF HORTICULTURAL IMPORTANCE WHICH OCCUR IN THE NEW ZEALAND INDIGE NOUS GRASSLANDS

Acaena (spp.) especially A. microphylla
Aciphylla colensoi
„ squarrosa
„ maxima
Agropyrum scabrum
Angelica montana (s)
Anisotome aromatica (s)
Aristotelia fruticosa
Arundo conspicua
Astelia cockaynei
Bulbinella hookeri
Carmichaelia uniflora
Cassinia fulvida
Celmisia coriacea
„ gracilenta
„ hookeri
„ lyallii
„ spectabilis
Chordespartium stevensoni
Clematis aloliata (s)
„ colensoi (s)
„ marata (s)
Coprosma repens
„ petriei
Cordyline australis (s)
Coriaria ruscifolia
Hymenanthera dentata
Leptospermum ericoides
„ scoparium
Leucopogon fraseri
Libertia ixioides
Linum monogynum
Mazus cunninghamii
Muehlenbeckia axillaris
„ complexa (s)
Notospartium carmichaeliae
„ torulosum
Olearia odorata (s)
„ virgata
Ourisia macrocarpa
„ macrophylla
*Oxalis corniculata
„ lactea
Parsonsia capsularis car. rosea
Phormium tenax
„ colensoi
Pimelea prostrata
„ lyallii
Poa caespitosa
„ colensoi
Podocarpus nivalis
Pratia angulata
„ macrodon
„ augustissima
Corokia cotoneaster
Craspedia uniflora
Cyathodes acerosa
„ colensoi
Danthonia cunninghamii
„ raoulii
„ „ var. flavescens
Dichelachne crinita
*Dichondra repens
Dracophyllum longifolium
„ rosmarini-folium
Discaria toumatou
Festuca novae-zealandiae
Gaultheria antipoda
Gaya lyallii var. ribifolia
Gentiana bellidifolia
„ corymbifera
Geum uniflorum
„ parviflorum
*Haloragis erecta
Helichrysum bellidioides
„ filicaule
Hierochloe redolens (s)
Ranunculus hirtus
„ insignis
„ lyallii
„ monroi
Raoulia australis
„ eximia
„ haastii
„ lutescens
Rubus australis
schoenus pauciflorus
Scleranthus biflorus
senecio lyallii
„ scozoneroides
„ monroi
Sophora microphylla
„ prostrata
Stipa arundinacea
Thelimytra uniflora
Veronica buxifolia
„ cupressoides
„ laevis
„ raoulii
Viola cunninghami
„ lyallii
Wahlenbergia albormarginata
„ gracilis

* Can become serious weed (s) Sweet smelling

The Banks Memorial Lecture 1956

The Banks Lecture for 1956 was delivered by Mrs. Olga Sanson, Director of the Southland Museum, who took as her subject "The Flora and Fauna of Stewart Island, and outlying Islands." Mrs. Sanson illustrated her lecture with slides, which we are unable to produce here, but the text of her lecture is given below.

IT is fitting, and we count it a privilege that, in this, Southland's hundredth year, we can honour a celebrated botanist—one who has been closely linked with our country—Sir Joseph Banks; and through him, all people who respect the good earth and living objects. It is plant life which sustains the living world.

Joseph Banks was botanist, explorer, and patron of science, president of the Royal Society for 44 years, and the first Director of Kew Gardens. When he sailed with Captain Cook on the Endeavour to New Zealand, he was 25 years old, and full of vigour and enthusiasm. Banks had with him an excellent botanist in an older man, a pupil of Linnaeus, Dr. Solander. He was to be largely responsible for the classification of the material discovered. Banks also had with him three artists and five servants. It was one of these, Nicholas Young, who was the first on board to sight New Zealand. The party was to be responsible for observing the transit of Venus, and this was no doubt the reason why Banks was known as Saturn, and his suite as Saturn's Ring.

You will recall the well-known journey and how, off Stewart Island, they also had a birthday on board, which they celebrated by killing a dog, from which they had a roast, a pie, and a haggis, thus satisfying the English, the Irish, and the Scots.

Nearly three years later the Endeavour headed for England and Kew Gardos, with such a galaxy of plant specimens that a botanical thirst was created for more knowledge of the flora of this long-isolated country. When George III became King, he speedily joined up the garden at Kew with the garden at Richmond Grove to form the now-famous Kew Gardens, and he invited Banks to be its first director. Both Kew and Richmond Grove are place names in Invercargill. Banks Peninsula and Solanders Rocks, to the southward, are named for the two botanists. Many plants, too, bear their names.

The first plant they collected on their first day ashore was a modest willowherb, the reed-like Epilobium. Banks has named for him a coastal fern, Blechnum Banksii, an orchid, Pterostylis Banksii and a Cordyline, as well as the "Kiekie" or screw pine, Pandanus Banksii, and an Astelia and Senecio from the North Island.

It was Dr. Leonard Cockayne who made the first official report on Stewart Island, in 1909. He was a competent ecologist, and that report, with a few exceptions, is valid today. Since then, deer and opossum have altered the face of the land. On the high hills where once were glorious natural gardens, the Anisitomes, lilies, buttercups, and daisies are now confined to the crevices and steep faces.

The Maori shore—Cabbage (Lepidium) and the succulent shore Celery (Apium), two plants which were collected at Poverty Bay and used so successfully by Cook against scurvy, are nearly eaten out by deer. The Lepidium, never plentiful (sometimes called Cook's scurvy grass), is now found only rarely on Herckopare, Bench Island and other outlying islands.

We can be thankful that those ancient plants the seaweeds have stayed safely in the water. Rich and profuse in varieties and colour they entice scientists from many parts of the world. I well remember when Professor Papenfuss, from the University of California, suddenly went down on his knees on Ringa Ringa Beach, where there was a rivulet of fresh water and some slimy green bootlaces, and said: "Ha! Papenfusiella!" Great variableness is given to the seaweeds by the cold water, west wind drift, and to a lesser extent, the warm South Australian current, and by the clearness and salinity of the water.

Greens, the shallow water plants, particularly Ulva, sea lettuce cover big areas. The intertidal Browns, with d'Urvillea, the bullkelp, Macrocystis (so rich in iodine), Hormosira, where the lunella or cat's eye shell lurks, many other strap weeds, popkelps and mermaid's hair ribbons (to give the local names) flourish under the prevailing conditions.

Among the reds, or deep water seaweeds, are the Carageens, so rich in food value. With only a few exceptions all seaweeds are edible.

Other lowly plants, the fungi, are well represented. Gilled fungus in all colours, the Judas ear fungus on some of the mutton bird islands, earth stars, and other pouch fungus, including the blue sectotium are plentiful in autumn. There is a green and lovely moss flora, to be expected where much rain falls (58 inches per annum) and where no frosts lie.

Liverworts, lycopods, and ferns abound. The kidney fern, Cardiomanes, and all the filmy ferns, Mecodium (these one cell thick leaves) are best seen when the bush is dripping wet. Tree ferns (four varieties) are not as tall as in the north, the wind keeps them levelled, and the deer gets at them in places.

The island bush is dominated by a rimu, rata and kamahi association with bog-pine (Dacrydium Intermedium and D. Biforme) in the south. A coastal strip is mostly mutton-bird scrub (S. Puffini) and grass tree (Drachophyllum or Inaka), where the coast is wilder and the bullkelp writhes and green codium sticks like glue ot the rocks. Tupari forms a wiry defence (Olearia colensoi vas Grandis) and Teteaweka (Olearia Augustifolia) that lovely scented daisy tree with white rays and violet discs, thrusts its rounded heads right into the salt spray. Pararas and kuakas nest underneath it in peat holes. Punud, too, is lush in this area.

In the back country—the valleys of the Rukiahua, Freshwater and Lord's River, the association is of bog-pines, some fuchsia, lowland ribbonwood and a small leafed wineberry and coprosmas. There is no beech forest, no kowhai and only an occasional black-pine. No celery pine or ngaio, these were bought and planted by the Maoris.

An analysis of the island peat would be interesting. Last year when a hole was dug here in Dee Street a ribbon of lignite there was found to contain pollen grains of beech, celery pine and coprosma. Slowly the rocks and the soil are being unriddled.

The Open Tops: Table Hill, Rakiahua, Mount Anglem and Mount Allen are a fine sight in summer-crevices and steep faces. On Mount Anglem besides the celmisias, geums and anistomes, the big buttercup is found (R. Lyallii) and the Archeria, a rare heath. They have not been noted elsewhere on the island hills. The celmisias are plentiful with their characteristic rosettes of leaves backed by tomentum as silky, or woolly, or suede like, as any modern weave. There are many native orchids. Ten terrestial ones, such as Thelymetra, Pterosylis, Corybas, Caladinia, and Childgloltis are plentiful on the trees, on the banks Dendrobiums, and the two Carinas are plentiful. Garochilus occurs occasionally. It looks like a fat green spider sprawled on a rata or muttonbird tree bark.

Fauna. Birds. You see the first birds in the Wairua; mollyhawks, bullers, and cantra, cape pigeons (chequer-board petrels), mutton birds, nillus (grant petrel), perhaps a gannt; and, of course, shags and gulls. A colony of bronze and Stewart Island shags has again been established, increasing from nine nests in 1954 to 93 nests in 1956.

Bush birds are in fair numbers: kakas, pigeons, tuis, bellbirds. Tomtits, fantails and grey warblers are seen about most homes, and of course, the weka or woodhen. Parrakeets, brown creepers, the fern bird and the big southern kiwi or tokoeka are further back—the fern bird and the robin (the Stewart Island robin: Petroica A Rakiura) on the quiet back country. At Big South Cape, saddlebacks, wrens and bush canaries have their backs to the wall.

Mammals: The only New Zealand land mammals, two species of bat, are found there. The short-tailed one is found only on Solomon Island, Big South Cape, the long-tailed one is more often seen. It clings to the sails of the boats sometimes when they are at their moorings with their sails drying.

But sea mammals are at their best in these rich waters. Seals are well represented, for seals are building up colonies again (Bench Island; cost to Pt. Adventure) the bolder and bigger sea-lion is sometimes met unexpectedly, an occasional sea-elephant and spotty leopard seal is seen.

As for whales this is their strolling ground: "Where great whales go sailing by, sail and sail with unshut eye."

The whalebone species—those that are filter feeders and live on the great rafts of plankton and copepods of the Antarctic seas, are at certain periods in these waters.

The species encountered include the blue, right, and humpbacks.

The humpback whales are the ones you are likely to see between October and December. They are returning south from warmer waters with their calves to their feeding grounds. But fin and sperm whales are here, for the sperm whales range the world. Their ambergris, which is found on Mason Bay and other ocean beaches, contains the "beaks" of cuttle fish, squids and octopuses. The sea is still full of mysteries. Living fossils, foraminilera, blue storm snails, and other moluscs abound.

From the great whales to the one-celled animals and plants is a big jump, but both are interdependent. At night these one-celled animals and plants cause the sea to stream with phosphorescent light. A water-logged piece of wreckage on the roadside gleams like Orion's Belt.

1957 DOMINION CONFERENCE

The 1957 Dominion Conference of the Royal N.Z. Institute of Horticulture and the National Show will be held in Whangarei on February 27th, 28th, and March 1st.

Enquiries are invited from Trade Exhibitors.

(Mrs.) E. M. WILSON
32 Dundas Road, Whangarei

The Temperature Requirements of Bulbs

M. Richards, B.Sc.Hort.,(Notts) N.D.H., N.D.H.(N.Z.)

It has long been recognised that temperature plays an important part in the control of plant growth. In most cases, however. the most critical temperature requirement of the plant is during its periods of active growth. with sometimes a need for low temperatures during the dormant or non-growing period. Many of the flowering bulbs are unique in that they have critical temperature requirements during the period when they are not in visible active growth. The Dutch have long since recognised this fact and their success as bulb growers has been due very largely to their investigations into this subject, and their ability to control the bulb's temperatures during these critical periods.

In New Zealand this need for certain temperature conditions does not appear to have been recognised nor understood; with the result that there have been many naive statements regarding bulb culture. Perhaps the worst of these has been the claim that certain bulbs could not be grown in the North Island because they are "cool climate" bulbs, yet none of them demands soil temperatures below 54 degrees F. in winter and there can be few areas of New Zealnad in which we do not reach this state. In this series of articles I am tracing the development of the bulb and showing how temperature affects each stage, in an endeavour to make this knowledge not only available. but also useful to the horticulturist.

Hyacinths

The normal time for lifting of Hyacinth bulbs in New Zealand is late November and December. At this time the foliage leaves have turned brown and died down. From this time the bulbs remain in dry storage until planting time in March — April.

To outward apearances there is no change taking place in the bulb during this time, but closer examination reveals that during this period some of the most important growth processes occur. If we cut a hyacinth bulb vertically immediately after liting, i.e. as soon as the top has turned brown, we would find the structure illustrated in Figure 1. At the base is the basal plate which represents the flattened stem of the plant. On this develop the growth buds and the roots. In the centre is the withered flower stem of the last growing season, and next to it the bud which will develop into next season's leaves and flower stem. This bud is enclosed in two scales which never develop as foliage leaves. Surrounding this is the base of the foliage leaves of last season with their attendant scales. Outside these is the base of the preceding year's foliage leaves etc. The outer papery scales are the remnant of old scale and foliage leaves.

In the centre of next season's bud is the growing point. During storage this growing point continues to develop. Under favourable conditions it will first give rise to another foliage leaf. and it then commences to develop flowers. These flowers remain small but they gradually become complete in every detail, even to formation of pollen grains. The number of flowers formed depends to a considerable extent upon the storage conditions, but is ultimately limited by the plant's hereditary factors. (With most New Zealand prepared bulbs the number formed is below the hereditary possible number). This phase of development takes about 6 weeks. Following this the bulb goes into a dormant stage, where no further growth occurs. although important chemical changes take place. These chemical changes affect the development of vigorous leaves and flower spikes in the spring.

If we cut open a bulb at planting time we should find a state of affairs as is shown in Figure 2. A fully formed flower, together with the foliage leaves is present, and these only require to develop to give rise to the flowers which are so much a feature of the Spring garden.

After planting the roots develop and supply a certain amount of nutrient and a considerable quantity of water to the bulb. Further chemical changes occur during the cool weather of winter, and with rising temperatures the leaves and flowers develop by extension of the cells already formed during storage.

Storage requirements

We can divide the storage period into two distinct phases, the flower initiation phase and the dormant phase the flower initiation phase is favoured by high temperatures. 75 degrees — 85 degrees F.. but may be completely stopped by temperatures above 93 degrees F. and below 50 degrees F. The dormant phase can only be passed satisfactorily at temperatures below 68 degrees F. The Dutch have found methods by which constant storage temperatures con be used to influence flower initiation and subsequent development to suit the grower's requirements. The figures given are a suitable guide, although some trial may be necessary to suit our conditions, and to adapt them to all varieties.

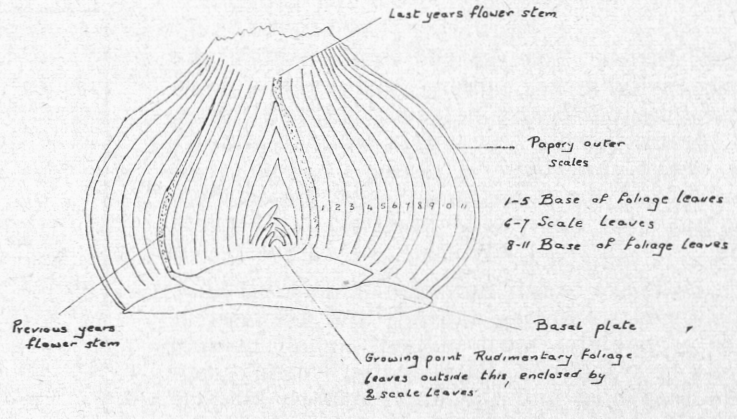
Bulbs for garden planting

With these bulbs quality of bloom is of the utmost importance. Storage of freshly lifted bulbs at 78 degrees F. for eight weeks, with relatively high atmospheric humidity favours flower initiation proceeding to the maximum possible. Following this the bulbs are stored at 63 degrees F. in low atmospheric humidity until planting time.

Bulbs for forcing

In Europe large numbers of bulbs are forced for early flower, for sale

HYACINTH BULB AT LIFTING TIME



both as cut flowers and as flowering plants. While good quality flowers are required for this trade, earliness of blossoming is also important, and growers are prepared to sacrifice some quality fo earliness. Two different treatments have been evolved for this purpose. (1) Immediately after lifting the bulbs are stored at 91 degrees F. for seven days. This temporarily inhibits flower formation but has the effect of speeding up flower formation at a later stage. Following this the bulbs are stored at 78 degrees F. until the outer petals on the flower spike are formed, this being determined by cutting open a few bulbs at intervals. The bulbs are then stored at 63 degrees F. for at least three weeks or until planting time. whichever is the longer period; (2) The bulbs are stored at 68 degrees F. for ten days, followed by 85 degrees until the outer petals are formed on the flower spike. They are then stored at 63 degrees F. for three weeks or until planting time. This treatment gives slightly later flowering than the previous treatment, but the flowers are of rather better quality.

The bulbs which are being forced must be planted in soil which has a temperature less than 55 degrees F. and temperatures must be kept below this until the leaves commence to appear above ground. If the soil temperature rises above 55 degrees flowering will be much delayed. When the growing point of the foliage is clearly visible, the air temperature in the glasshouse is raised to 75 degrees F. As the flower emerges from the leaves the temperature is reduced to 65 dgrees F.

Bulbs to be shipped to the opposite hemisphere

Bulbs which have to be shipped from one hemisphere to another present a problem, in that if they are shipped when lifted they will not arrive at their destination at the correct time for planting. Bu using suitable storage temperatures, development of the bulbs can be retarded so that they may be shipped to arrive at their destination at the correct time for planting. Immediately after lifting the bulbs are stored at 86 degrees F. for at least 10 weeks. During this period of high temperature treatment the flower bud inside the bulb is slowly developing, so that at the end all the flowers of the inflorescence are formed. Following this the bulbs are stored at 30 degrees F.. i.e. just below freezing point for a further ten weeks or until the bulbs are ready for shipping. In this temperature the development is to all intents stopped. One would expect that it would be best to maintain this temperature until planting time. but experiments have shown that bulbs treated in this way have failed to produce roots and shoots. A period of high temperature is necessary to break the dormancy induced by the very low temperature in storage 6 weeks or more at 77 degrees F. has been found to be the optimum to induce normal growth after planting.

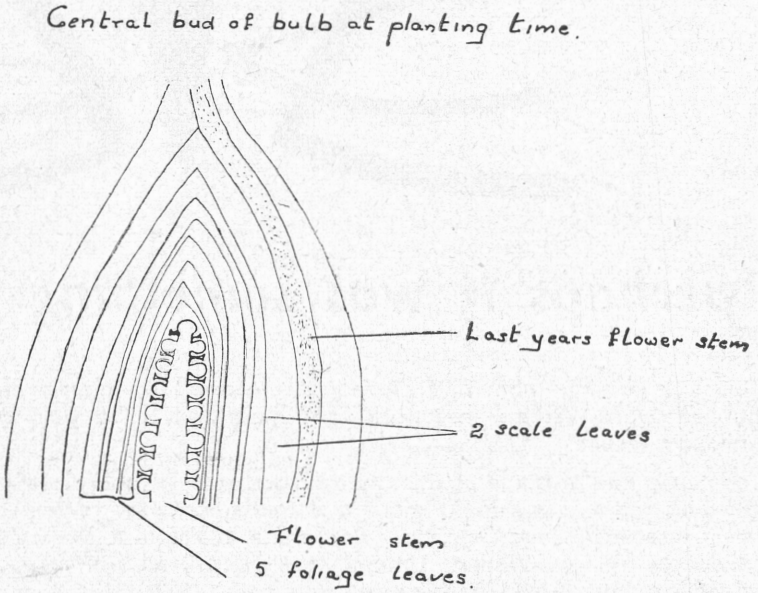
Thus in the retarding treatment three successive temperatures are used, 86 degrees, 30 degrees and 78 degrees. The slow development helps to use up the time involved, and also gives a strongly developed inflorescence which will withstand the conditions of the low temperature treatments in which all the normal life processes are practically brought to a standstill.

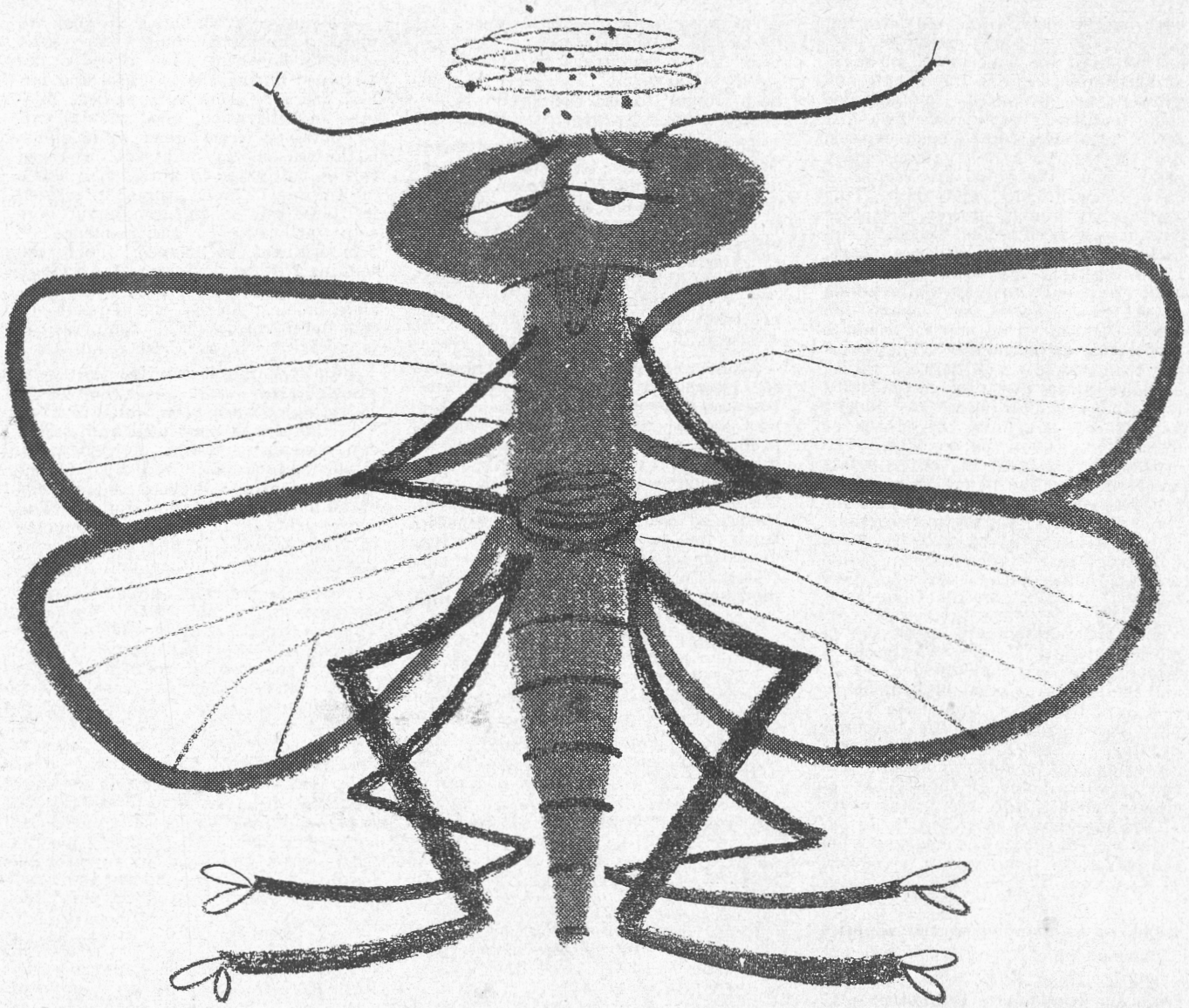
Besides preparing bulbs in this way for export the Dutch exporters and research stations retard bulbs in this way so that Hyacinth flowers can be produced over a long season when necessary. For such work, it is of course, necessary to be able to grow the bulbs in temperature controlled rooms. so that suitable soil temperatures can be given. otherwise the development of the bulb does not follow the normal pattern after planting.

We can see from this that when we plant a hyacinth bulb, the next season's flowering is already determined during the storage, and unless there is some very radical mistake in cultivation, good results will be obtained from good bulbs. This is the reason why bulbs such as these can be cultivated in fibre, or in bowls of water. Those people interested in this form of culture should give some attention to the sequence of temperatures mentioned under the heading, "Blubs for forcing". Although strict temperature control is not possible in most homes, the sequence of cool temperature, high temperature. is necessary to get best results.

Finally, I might mention that good storage can only be effective on bulbs which have been well grown to build up a well nourished bulb which can develop a strong flower spike. Good culture, followed by correct storage is the secret of the success of bulbs imported from Holland. The successive falling off in performance in New Zealand is due to our comparatively poor culture and storage.

(To be continued)





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Double Working at Budding Time

M. Richards, B.Sc.Hort.(Notts) N.D.H., N.D.H.(N.Z.)

Those who propagate trees by budding and grafting are familiar with the phenomena of incompatibility between stock and scion. This may be shown in several ways, the two most usual being failure of stock and scion to unit, or failure of the scion to grow satisfactorily after union. This incompatibility is often overcome by the technique known as double working. that is, the use of a piece of wood of a third variety compatible with both stock and scion, between them. In budding this necessitated two year budding, the intermediate the first year followed by budding with the scion variety in the next year.

In recent years a method has been developed which allows this double budding to be done in one operation. It would perhaps be more accurate to say that two methods have been developed, as two different techniques have been used, both based on the same principle. Both were developed indepently, one in Great Britain, the other in Germany at the same time.

In the English method, developed by R. J. Garner of East Malling Research Station. a small piece of the intermediate variety takes the place of the lower part of the bud shield. This apparently serves to regulate the processes which cause failure of the stock and scion to unite in its absence. A piece of the intermediate is cut as if to form a bud shield, the lower part is cut off and inserted into the stock as for normal buding. The bud shield of the scion variety is cut as normal, but the lower part is removed, and the remainder is inserted above the intermediate. This practice is illustrated in Figure 1.

The second method was developed by Herr Peter Nicolin of Bonn, Western Germany. In this method a typical bud shield is first removed from the intermediate variety, and this is discarded. A thin slice is then removed from underneath this, and this slice of intermediate is then placed in position under the bark of the stock. A bud shield of the scion variety is then placed in front of this, being separted from the stock by the thin slice of intermediate. To use this method it is necessary that the intermediate slice and the bud shield must have been cut from shoots of equal diameter so that they match one another. The process is illustrated in Figure 2.

It is difficult to predict with any accuracy the extent to which these techniques will be used in New Zealand but where double working is necessary. they offer an easy and quick technique which will no doubt be worth exploiting.

The drawings used have been adapted from the original reports. Garner. Annual Report East Malling Research Station, 1952, page 175. Nicolin Deutsch Baumschue Vol. 5 No. 7, July, 1953.

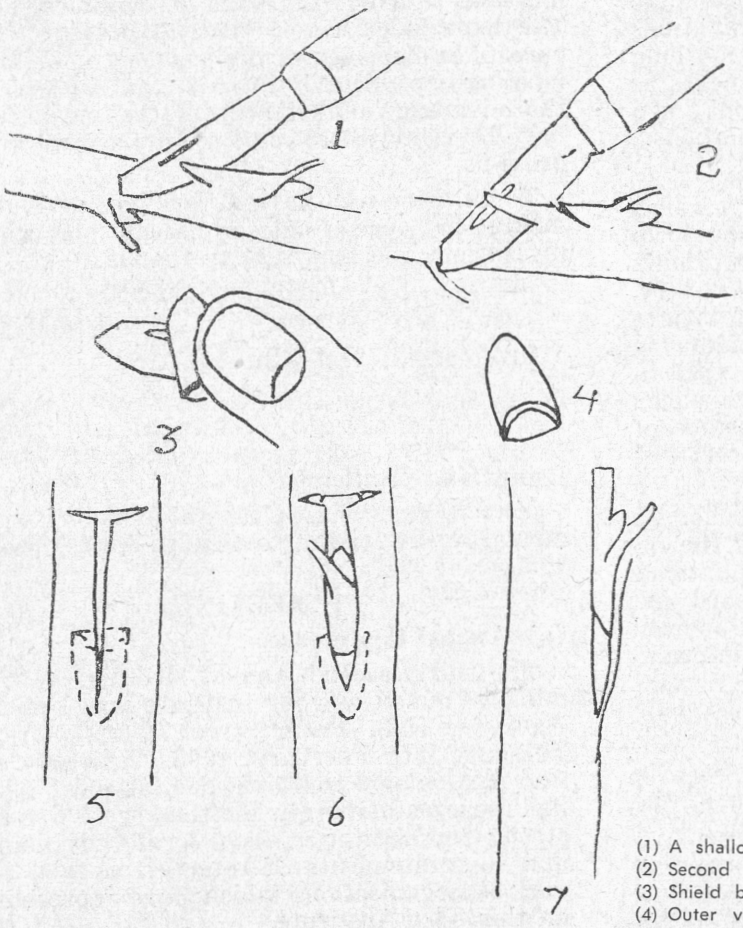

FIG. 1

(1) A shallow cut in a shoot of intermediate.
(2) Second cut to procure budless shield.
(3) Shield between knife and thumb.
(4) Outer view of prepared shield.
(5) Dotted line shows position of shield after it is inserted in the stock.
(6) Scion variety bud inserted above and overlapping the shield.

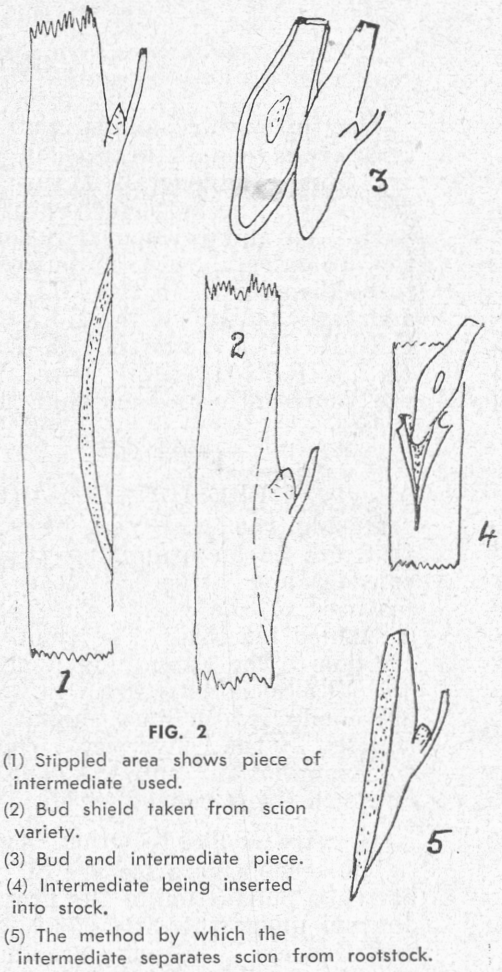

FIG. 2

(1) Stippled area shows piece of intermediate used.
(2) Bud shield taken from scion variety.
(3) Bud and intermediate piece.
(4) Intermediate being inserted into stock.
(5) The method by which the intermediate separates scion from rootstock.

Royal N.Z. Institute of Horticulture

33rd. Annual Conference

Held at Invercargill, 31st January, 1956.

The thirty-third annual conference of the Institute was held at Invercargill on Tuesday, January 31st. In general, it was agreed that this was one of the most successful conferences ever held. An admirable moderation on the part of the delegates allowed the business on the agenda to be disposed of in time for conference to hear addresses by Mr. K. E. Hockey, N.D.H. (N.Z.), F.R.I.H. (N.Z.), and Mr. J. A. Hunter, N.D.H. (N.Z.), F.R.I.H (N.Z.), both of whom attended the fourteenth International Horticultural Congress.

PRESIDENT'S ADDRESS

During the past year the activities of the Institute as an examining body have increased considerably. This has been one of the main features of the year. The future will show a continued increase. The thanks of all members are due to the Examining Board, the Examiners and all associated with them. The examinations are conducted on lines similar to those so long adopted by the University. The requirements as to examination, subjects and conditions, are authoritatively defined by statutory regulations.

Approaches by Other Organisations

The second main feature of the past year has been the publication of the first issue of our own Journal under the title of "New Zealand Plants and Gardens." Thanks are due to our Editor, and the small staff who have co-operated in producing the first issue. Thoughtful leaders in horticulture have long desired to see such a publication. The Journal will reflect the policy of the Insttiute, and will be the means of disseminating valuable information in the way of authoritative papers.

The rank and file of our members, who are essential to the successful functioning of the Institute, have on the average little acquaintance with the activities of the Examining Board and its importance. It is hoped that our Journal will from time to time contain sufficient information to correct this.

Numerically, our membership shows a satisfactory increase. It is pleasing to note that Waikato District Council continues in the lead in this regard. We welcome the formation of the latest District Council, Northern Wairoa.

Our finance is satisfactory, and should occasion no anxiety in the future. This is largely due to a very effective and watchful Finance Committee the point of view of the administration it is of who keep endless care of the position. From the utmost importance to have a strong Finance Commitee. In this the Institute is very fortunate indeed.

Our Annual Conferences should be something more than just an annual meeting of the Institute. We should make time for the inclusion of learned and informative addresses. This we hope to achieve at the present conference. Our agenda includes addresses by Mr. K. C. Hockey and Mr. J. A. Hunter on aspects of the Fourteenth International Science Congress at The Hague in August-September last. Also we look forward to hearing Mr. A. M. W. Greig on the report of our sub-committee on Soil Conservation.

Technicalities are wearisome, and we should all remember that we are gathered from all over the Dominion in the cause of Horticulture. We are not here to argue the point on technical details. The hope is expressed that all present will cooperate in disposing of the business of the annual meeting expeditiously in order that we may have the advantage of listening to the speakers who have been invited to come to Invercargill and address us.

To all those who have so loyally contributed to making my year of office a pleasant one, I extend my sincere and appreciative thanks.

JOHN HOUSTON,

President.

Invercargill, 31st January, 1956.

Ladies and Gentlemen,

Your Council has pleasure in submitting its annual report for the year ended 30th September, 1955.

1. MEETINGS

(a) Annual Conference:

The thirty-second Annual Meeting of the Dominion Council of your Institute was held in St. Andrew's Hall, Tuam Street, Christchurch, on Tuesday, 15th February, 1955. This conference was particularly well attended, as most districts had representatives; in addition, there was a very strong representation from local body chairmen and superintendents of reserves, as well as the various organisations which have representation on this, your Institute.

His Worship the Mayor of Christchurch, Mr. M. P. Macfarlane, officially opened the Conference.

(b) Dominion Council:

The Dominion Council met on five occasions during the year, whilst your Executive Committee met twice. There was an average attendance of opproximately 18 members at all Dominion Council meetings, which reflects great credit on delegates, as some representatives travel from far afield.

(c) Sub-committee Meetings:

Many sub-committee meetings were held during the period under review, and your Finance Committee also met on three occasions. The Publications, Examining Board and Special Committees met frequently and as a consequence the administration of your Institute received careful consideration.

2. OBITUARIES

It is with regret that your Council records the loss of several outstanding horticulturists during the year. Their loss will be sadly felt. One of these members was an Associate of Honour, Mr. F. H. Brown, of Auckland, and your Council sympathises with the surviving relatives. Mr. F. S. Pope, F.R.I.H. (N.Z.), a former president of the Institute, passed away during September. 1955. Mr. Pope's contribution to the early work of the Institute will be remembered by many and his loss will be keenly felt by those associated with the early history of our Institute.

3. MEMBERSHIP

It is pleasing to record an ever-increasing membership—from 1944 in 1954 to 2140 as at 30th September, 1955, which represents an increase of close on 200 members. Every District Council has recorded an increase in its membership with the exception of one area. Thus it would appear that in 17 of the 18 District Councils of the Institute, interest is increasing. Waikato District, under the chairmanship of Mr. A. W. Green, N.D.H. (N.Z.), A.H.R.I.H. (N.Z.), is the leading district council with a total membership of 281, whilst close behind Waikato comes South Taranaki, the total membership there being 246. The undermentioned analysis of membership figures is self explanatory:—

	1955	1954	1953	1952	1948
Individuals	1617	1460	1354	1469	958
Firms and Societies	105	103	103	110	118
Local Bodies	28	9	45	50	52
Fellows	354	338	316	360	374
Associates of Honour	36	34	33	31	18
	2140	1944	1853	2020	1520

It is pleasing to record the addition of a new District Council during the year, Northern Wairoa, whose present membership stands at 69.

4. FINANCE

(a) Annual Accounts:

In last year's report there appeared a statement to the effect that there was an excess of expenditure over income to the extent of £201 15/- and this was borne out by the actual accounts for the year ended 30th September, 1954. It is therefore pleasing to record that during the year just past the accounts reveal an excess of income over expenditure to the extent of £104/7/4d. This is in the main due to the support accorded the Institute by the local bodies, donations from which totalled just over £100.

(b) Trust Accounts:

The Trust Accounts are again set out separaely in the statement and members will be pleased to observe that the Publication Account has grown to the extent of £753/17/9d. The total Trust monies now amount to £1,608/18/5d, as against £1,348/9/1d. for the previous year.

(c) Increase in Subscriptions:

Due to the increase in the cost of production, notification was received from the publishers of the "New Zealand Gardener" that the price of the "Gardener" to all its readers would be increased, effective from 1st October, 1955. It had become necessary to increase the subscription of our members and having regard to increased costs generally, the following scale was accepted as necessary:—

	£	s	d.
Fellows (with delivery of "N.Z. Gardener")	2	0	0
Fellows (without delivery of "N.Z. Gardener")	1	5	0
Firms and Societies (with "N.Z. Gardener")	2	0	0
Members (with "N.Z. Gardener")	1	10	0
Firms and Societies (without "N.Z. Gardener")	1	5	0
Members (without "N.Z. Gardener")		15	0
Life Membership	15	15	0
Registered Students		10	0
Junior Members (Children)		2	6

5. CUSTOMS DUTY EXEMPTIONS

During the year under review a letter was received from the Canterbury Horticultural Society intimating that Customs duty had been charged by the Department on medals imported for award purposes from the Royal Horticultural Society. Representations were made to this Institute by the Canterbury Horticultural Society and as a result of correspondence with the Minister of Customs, the Institute is pleased to record that complete exemption from Customs duty will in future be accorded to medals imported from the R.H.S. for award purposes; duties already paid are to be refunded.

Members will, of course, be aware that last year representations made to the New Zealand Government for exemption from gift duty for gifts made to the Canterbury Horticultural Society to assist in their building project were successful, and your Institute would like gratefully to acknowledge the assistance accorded horticulture in New Zealand by the Government.

6. LOCAL BODY DONATIONS

As intimated elsewhere in this report, the support accorded theInstitute by local bodies during the past year has been most marked and your Institute would like to record its grateful acknowledgement to all local bodies throughout the Dominion who have contributed to the funds of the Institute and thereby encouraged those associated with the administration of your organisation.

7 PUBLICATIONS

In last year's annual report appeared a statement to the effect that the Institute was proposing to produce its own Journal and it is now pleasing to record that this proposal has been realised. The Publications Committee, in conjunction with the Finance Committee, have completed arrangements with the Garratt Printing Company for a quarterly issue commencing from December, 1955. This work is in the hands of Mr. M. Richards, B.Sc. (Hort.), N.D.H., Lecturer in Horticulture, Massey College, and Mr. L. Riley, of the "Evening Post," a trained journalist, with the General Secretary assisting in administration.

8. ARBOR DAY

Once again your Institute District Councils have taken an interest in Arbor Day activities throughout the Dominion. Several thousand native trees and shrubs were planted throughout New Zealand and it is pleasing to record that this most important day to horticulturists is being observed and more interest taken generally by the public in planting and maintaining trees.

9. URBAN SPRAWL AND LAND DEVELOPMENT—MARKET GARDENING LAND BEING TAKEN FOR HOUSING

Members will recall that at the last annual conference a report was tabled by Mr. A. M. W. Greig, B.Sc., N.D.H. (N.Z.), F.R.H.S., Director of the Horticulture Division, covering the work of a special committee set up by the Institute to consider this problem. The discussion which ensued at the annual conference was most interesting, particularly in view of the presence of a representative from the Town and Country Planning Section, Mr. J. Johnson. A resolution was passed at the conference congratulating the sub-committee on its report with a recommendation that, in view of the vital nature of the subject, the Institute should fully support the Government if it implemented the spirit of the legislation already enacted covering this important matter. Your Institute has been active in publicising the matter and copies of the report were distributed throughout the Dominion. The Dominion Council has not lost sight of the problem and is publicising the principles laid down in the report at every opportunity. As this annual report is being prepared the Institute is corresponding with the Government regarding the matter.

10. NATIVE PLANT PROTECTION BILL

During the year attention was drawn by Dame Elizabeth May Gilmer, D.B.E., A.H.R.I.H. (N.Z.), to the despoiling of native foliage throughout the Dominion. Emphasis was laid by Dame Gilmer on the fact that this was an offence under the above-named Bill and acting on her suggestion, publicity was accorded the matter in the columns of the local newspapers throughout the Dominion and in the "New Zealand Gardener."

11. CONSTITUTION

During the year opportunity was taken to amend the Constitution to agree with the Registrar's wishes regarding representation by Government Departments on the Dominion Council.

12. 14th ANNUAL HORTICULTURAL CONGRESS

Your Institute was represented at the above Congress by Mr. J. A. Hunter, N.D.H. (N.Z.), F.R.I.H. (N.Z.), of Auckland. Mr. K C Hockey, ND.H. (N.Z.), F.R.I.H. (N.Z.), of Massey College, was also in attendance at the Congress, which was held at Scheveningen, a seaside resort some four miles from The Hague. An invitation has been extended to both of these members to attend our annual conference and address those present on their experiences and the information gleaned from the Congress.

13. SOIL CONSERVATION

During the year a special committee was set up to deal with Soil Conservation and your Council wrote to the Minister in Charge of Forest Service advocating the reduction of the cutting of native trees, as it was felt that a general overall reduction in the felling of timber would result in an improvement of the erosion position. The work being carried out by Mrs. Du Pont in acting as chairman of this committee is deserving of the gratitude of your Institute.

14. AMERICAN VISITORS

It is pleasing to record that horticulturists from the U.S.A. visited New Zealand and were welcomed throughout the Dominion by local District Councils.

15. RETIREMENT OF MR. M. J. BARNETT

At the September, 1955, meeting of the Dominion Council the following resolution was recorded:

"That this Dominion Council meeting, representing delegates throughout the Dominion and leading horticultural Institutions places on record its appreciation of the valuable service rendered to the Institute by Mr. M. J. Barnett, M.B.E., N.D.H. (N.Z.), A.H.R.I.H. (N.Z.), and joins with his many colleagues in wishing him a long and happy retirement."

Several speakers paid tribute to the outstanding contribution to horticulture made by Mr. Barnett during his association as Director of the Reserves Department in Christchurch, and even prior to that. Members will be aware that Mr. Barnett is a past president of this Institute and it is pleasing also to note that he is still taking an active part in Institute affairs.

16. EXAMINING BOARD

(a) Meetings:

During the year the Board met on five occasions with an average attendance of eight members, meetings taking place in October and December, 1954, and May, August, and September, 1955.

(b) Chairmanship:

Towards the end of 1954 Mr. G. V. Wild informed the Examining Board that due to various reasons it would not be possible for him to continue membership of the Board and it would therefore be necessary for the Board to consider the appointment of a new chairman. Mr. E. Hutt, N.D.H. (N.Z.), A.H.R.I.H. (N.Z.), was appointed to the position of chairman. Board members were most appreciative of the valuable contribution made to the Institute's educational work by Mr. Wild and his loss was keenly felt. A presentation of horticultural volumes was made to Mr. Wild from Board members through the courtesy of His Worship the Mayor of Wellington, Mr. R. L. Macalister, in the Mayor's rooms during the latter part of 1955.

(c) Revision of Prescriptions:

Extensive work has been carried out by the responsible sub-committee to bring the syllabus prescriptions covering the N.D.H. (N.Z.) and N.D.F.C. (N.Z.) up to date, and it is pleasing to note that this work is now nearing completion.

(d) Additional Examinations Gazetted:

The Examining Board is pleased to report that students desiring to sit for the Seedmen's Certificate and the Certificate in Vegetable Culture may now do so in accordance with syllabuses which came into force on the 1st of January, 1955. This now brings the number of examinations for diplomas and certificates being carried out by the Board to five, as detailed below:—

(i) N.D.H. (N.Z.)—National Diploma in Horticulture.
(ii) N.D.F.C. (N.Z.)—National Diploma in Fruit Culture.
(iii) S.C. (N.Z.)—Seedsmen's Certificate.
(iv) C.V.C. (N.Z.)—Certificate in Vegetable Culture.
(v) C.S.G. (N.Z.)—Certificate in School Gardening.

(e) Grant of Certificate and Diplomas under the R.N.Z.I.H. Act 1953:

Provision is made under the above-named Act for the Examining Board to recommend that the Institute grant Certificates and Diplomas to any person who:—

(i) Is not less than 40 years of age;
(ii) Has practised horticulture or any branch thereof for not less than 20 years;
(iii) Who, in the opinion of the Examining Board, is qualified to receive the Certificate or Diploma.

Publicity was accorded the provisions of the Act covering these awards in the case of the Seedsmen's Certificate and the National Diploma in Fruit Culture, and as a result various applications were received for the awards. These applications were referred to special sub-committees set up to deal with the matter, and as a result there will appear in the first issue of the Institute Journal the names of those qualified to receive the awards. In each instance 50 awards were granted.

(f) Liaison with Students:

Liaison with students through District Councils has continued during the year and all registered students were sent examination entry forms, and copies, where applicable, of the new and revised syllabuses.

(g) Examination of Theses:

As part of the Institute's examination programme a number of theses were submitted during the year and examined by persons appointed by the Examining Board. The work put in by students in the preparation and compilation of their theses is considerable and the Board hopes that as the years progress the standard of theses submitted will improve.

(h) Congratulations:

Congratulations are extended to Mr. P. J. Hubbers, of Auckland, on securing the J. A. Campbell Memorial Award as a result of the 1954 examinations. Your Board decided that there should be no award of the Cockayne Gold Medal for the year 1954.

Congratulations are also extended to Mr. A. E. J. Smith and to Mr. M. P. Reitcheson, of Auckland, on completing their N.D.H. (N.Z.).

17. LODER CUP AWARD—1955

On behalf of members your Council would extend to Mr. M. C. Gudex, M.A., M.Sc., A.H.R.I.H.

(N.Z.), N.D.H (N.Z.), F.R.I.H. (N.Z.), congratulations on being awarded the Loder Cup for 1955. Mr. Gudex's influence and invaluable assistance to horticulturists in the Waikato area is well known throughout the Dominion.

18. VOTE OF THANKS

The thanks of your Dominion Council are extended to all those who have contributed to the progress achieved during the past year and in particular to:—

(1) The New Zealand Government, Ministers of the Crown and Departmental officers, in particular, the Director of the Horticulture Division, Mr. A. M. W. Greig, B.Sc., N.D.H. (N.Z.), F.R.H.S.
(2) Local bodies for their continued interest and financial support and to the Superintendents of Reserves throughout the Dominion.
(3) Examiners who set the papers covering all aspects of horticultural education.
(4) All members, District Chairmen and local Councillors for their active assistance in fostering the Institute objectives in their respective areas and to all others who have assisted directly and indirectly in furthering the objects of the Institute.

19. CONCLUSION

That the Institute's influence has been considerably strengthened and extended during the year just ended is evidenced by the increase in membership, the interest being taken in the Institute's examinations, and the production of its own publication. Apart from the financial aspect and increase in assets, the future prospects of the Institute appear to be good. With each passing year there is every indication of continued progress and consolidation and the position of your Institute both in horticultural circles and in the community itself is growing steadily.

Much remains to be done—even better results can yet be achieved. The work of the District Councils and those committee members who sit on the District Councils throughout New Zealand is producing results and these members can be justifiably proud and satisfied that the time spent in furthering the objects of the Instiute is a worth-while contribution to the progress of an organisation which is playing an important and even vital role in the progress of horticulture in the Dominion.

JOHN HOUSTON, LL.B., President.
Royal New Zealand Institute of Hortculture (Inc.).

ASSOCIATES OF HONOUR, A.H.R.I.H. (N.Z.).

During the last two years four new Associates of Honour have been elected at Annual Conferences. In 1955 two members were honoured in this way.

Mr. Alfred William Green, Hamilton.
Mr. Cecil McLean Smith, Christchurch.

In 1956 two further Associateships were conferred:

Mr. A. W. Anderson, Timaru.
Dr. John Stuart Yeates, M.Sc., Ph.D. (N.Z.), Ph.D. (Cantab.).

We publish here the citations which were forwarded from the nominating District Councils.

Mr. Green was born in September, 1884, and after passing the Public Service and Matriculation examinations, he served an apprenticeship of three years in David Hay's nursery gardens, of Auckland.

Between 1903 and 1905 he attended classes at Auckland University College and obtained passes in General Biology and Botany, Stage I, standard.

In 1907 he was appointed as Horticulturist and Plant Breeder at the Government Experimental Farm, Ruakura. He laid out the grounds and planted the well-known drive of native trees and plants. He was made Farm Manager in 1917 after producing the rust-proof oat known as "Green's Rust Proof Oat." He gave lectures to returned soldiers and organised refresher courses for agricultural instructors.

In 1925 he retired from Ruakura and was a farm supervisor in all parts of the Dominion. He was a lecturer at Hamilton Technical College for many years in agriculture, particularly at Teachers' Farm Schools.

Since 1946 he has cultivated his own nursery at Hamilton, one of the cleanest and best-kept in this province.

In 1929 he gained the National Diploma of Horticulture and in 1947 was made a Felow of the Royal New Zealand Institute of Horticulture.

Mr. Cecil McLean Smith graduated M.A. at the Otago University in 1914. From 1915 to 1919 he served overseas with the 1st N.Z.E.F. At the cessation of hostilities he obtained a New Zealand Expeditionary Force Scholarship and decided to study Forestry at Edinburgh University, where, in 1922, he obtained his B.Sc. (Forestry).

On his return to New Zealand he entered the New Zealand Forest Service and for three years was Forest Ranger in Otago and Southland and was then appointed as Conservator of Forest for the Nelson and Marlborough District, where he inaugurated the land purchase and establishment of the Golden Downs State Forest, now over 20,000 acres in extent. In 1931 he was appointed Chief Inspector of the New Zealand Forest Service, which office he held for 18 years. In 1950 he was appointed to the position he now holds, that of Director of the Botany Division, Department of Scientific and Industrial Research.

In 1928 to 1930 Mr. Smith was external examiner in forestry for the University of New Zea-

land. In 1934-1935 he was president of the New Zealand Institute of Forestry and in 1939 was president of the Royal Society of New Zealand (Wellington Branch).

In addition to his outstanding work in forestry in New Zealand, Mr. Smith has always taken a keen and active interest in horticulture and in the preservation of our New Zealand flora.

From 1934-1938 he was a member of the Loder Cup Committee. For the past five years he has been, and still is, a member of the Institute's Examining Board, and from 1952 he has been a member of the Executive and Dominion Council of the Institute. He has also served on several of the sub-committees appointed by the Institute.

Mr. A. W. Anderson, Superintendent of Parks and Reserves, Timaru.

Mr. A. W. Anderson received his early training in Horticulture at Littlewood Park, Alford, Aberdeenshire, Scotland. Littlewood Park was then famous through Britain for its large twin herbaceous border. It was his association with these famous borders that inculcated in Mr. Anderson an abiding love for herbaceous plants, a love which is still very evident in the well-tended and varied collection of plants to be seen in the Blue Border, and Long Borders, at the Timaru Botanical Gardens.

In 1923 Mr. Anderson entered the Royal Botanic Gardens, Kew, as a student gardener, where he continued until 1926, when he was chosen to take up a position as a foreman at the Dunedin Botanic Gardens, where he gained the confidence and esteem of the late David Tannock, to whom he is indebted for a thorough grounding in Horticulture under New Zealand conditions.

Mr. Anderson readily developed a keen interest in and love for New Zealand plants, particularly our alpine flora. Many visits were paid to the bush lands and mountain regions of Otago and Canterbury for the purpose of obtaining at first hand a knowledge of our indigenous plants in their native habitat. This knowledge was not only applied with success at the native garden at Dunedin, but was also the genesis of many articles on our native flora, which have been published in the leading horticultural journals of Britain and the United States of America.

In 1932 Mr. Anderson was appointed Superintendent of Parks at Timaru, a position he still holds. During his term of office at Timaru he has been entrusted with the design and development of several new parks and playgrounds, and has done excellent work in the further development and planting of Caroline Bay.

SEED EXCHANGE

The letter printed below has been received by the Secretary. Any member interested is invited to write direct to Mr. Stryker, Langlois, Oregon, U.S.A.

The Secretary,
R.N.Z.I.H.

Dear Sir:

I wonder if you could put me in touch with a source of seed of New Zealand plants I have quite a few plants from down there growing in my gardens here and all seem to be doing very well, in fact many of them are reseeding themselves all over the place, so that one day I too, shall have a "Bush" here in Oregon.

I am a fellow of the Royal Horticulture Society and also, since I have quite a collection of plants here in the garden, plus living in an area where there are many fine native platns, have sent out a seed-exchange list to many botanic gardens throughout the world. Royal Botanic Gardens at Kew, Edinburgh, and also Glasnevin, in Eire, as well as Hongkong and many here in America.

If you have a seed exchange I should greatly appreciate being put on the mailing list. If not any suggestions will be most welcome!

Very sincerely,
DONALD W. STRYKER,

As a keen student of horticultural literature Mr. Anderson has always kept in touch with plant discoveries overseas, and has been one of the first to introduce to this country new plants which he has not hesitated to share with his colleagues. As far as can be ascertained, to him must be given the credit of first introducing to New Zealand the now famous Metasequoia glyptostroboides.

Mr. Anderson has made a close study of the historical background of our garden plants and in 1950 his book, the "Coming of the Flowers," was published in London. To state that this book was "well received" would not be doing justice to it, or its author. To date, there have been five impressions in Britain and three in the U.S.A. The Country Book Club adopted it for its issue for August, 1952. A new edition under the title "How We Got the Flowers" is expected soon.

By his writings on New Zealand plants Mr. Anderson of recent years has probably done more than any other person to bring New Zealand and its flora to the notice of horticulturists in other countries.

Dr. Yeates has been prominent in the horticultural world for several years. He has interested himself in several aspects of horticulture, including:—

(a) Propagation: The tip-grafting of azaleas and rhododendrons. He did a good deal of original work on tip-grafting of camellia reticulata, a result of which has been to make this plant more plentiful in New Zealand and world gardens. An article on this subject has been published in the Royal Horticulture Society's journal. He has also dealt with several other aspects of this subject.

(b) Lilies. He has by selection and hybridisation evolved several improved forms of Lilium auratum. These were displayed by Messrs. Wallace, of England, at the 1953 Chelsea Show.

(c) Rhododendrons and azaleas. Since its inception Dr. Yeates has been secretary to the New Zealand Rhododendron Society. He has been responsible for the growing, propagation and distribution of several species and varieties of this genus through New Zealand. He has been responsible for the introduction of new hybrids from the famous collections at Exbury and Bodnant into New Zealand. They have been propagated and distributed through New Zealand.

Dr. Yeates was one of the foundation members of the Manawatu District Council and has served several terms as a committee man, and two terms as chairman. He is also a vice-president of the R.N.Z.I.H. Dr. Yeates has faithfully served the cause of horticulture by disseminating his knowledge by articles. He is in demand as a lecturer in both islands. His publications include a book on "Farm Trees and Shelter Belts," and he has contributed articles in Royal Horticultural Society's journal.

EXAMINATION RESULTS

The following list gives the names of candidates who were successful at the examinations held in 1955.

N.D.H. (N.Z.)

Junior Examination

Subjects

2. Bookkeeping.
3. Horticultural Botany.
4. Principles of Plant Protection.

Passes

Barber, E. M., 4, 5.
Bell, D. C., 2, 3.
Clark, H. A., 3, 5.
Crossen, T. I., 2, 3, 4.
Field, D., 2, 3, 4,5.
Jackson, G. C., 3.
Lycette, R, 3, 5.
McGregor, I. A., 2, 3, 4.
Morgan, A. G., 4, 5.
Manson, R. J., 3, 4, 5.
Orr, W. R., 5.
Perkin, M. W. L., 2, 3.
Trudgeon, N., 3.
Van Den Bosch, 2.
Visch, L., 2, 3.
Wagstaff, T. S., 3, 5.

Intermediate Examination

Subjects

6. Principles of Botanical Classification.
7. Principles of Horticulture I.
8. Practice of Horticulture I.
9. Special Subject I.
10. Oral and Practical.

Passes

Collins, D, 7, 8.
Edwards, M. E., 8, 9.
Jordan, R. F., 8, 9, 10.
Sullivan, J. F., 8, 9.
Van Den Bosch, 7.
Wood, G. A., 6, 7.

Diploma Examination

Subjects

11. Principles of Horticulture II.
12. Practice of Horticulture II.
13. Special Subject II.
14. Oral and Practical.
15. Thesis.

Passes

Bradbourne, G. J., 11, 12, 13, 14.
Clark, L. K. 11, 12, 13.
Farmer, A, 12.
Haggo, B. R., 11, 13.
Hookway, A. M., 12, 14.
Jardine, L. L., 12, 13.

Moffit, A. I., 13.
Porter, A. T., 12, 13.

The following candidates completed a Section in 1955.

Junior

Mr. D. Field.
Mr. A. G. Morgan.
Mr. R. J. Manson.
Mr. H. Van Den Bosch.

Intermediate

Mr. R. Jordan.

National Diploma in Fruit Culture, N.D.F.C. (N.Z.)

Passes

Crooks, M., Practice of Horticulture I.

Van Geldermalsen, M., Principles of Horticulture II, Practice of Horticulture II, Practice of Fruit Culture I, Oral and Practical.

Paulin, G. N., Principles of Horticulture II, Practice of Horticulture II, Practice of Fruit Culture I, Oral and Practical.

Certificate in School Gardening, C.S.G. (N.Z.)

2. Horticultural Botany.
3. Principles of Plant Protection.
4. Principles of Horticulture I.
5 Practice of Horticulture I.
6. Oral and Practical.

Passes

Beever, J., 2, 3, 4, 5.
Check, M. G., 3.
Symons, N. O., 2, 3.

Certificate in Vegetable Culture, C.V.C. (N.Z.).

Passes

Brown, R. H., Plant Protection, Vegetable Production.

F.R.I.H. (N.Z.)

During Conference a number of members were elected as Fellows of the Institute. The list of those is printed below.

Canterbury District

Mr. Huia Gray Gilpin, Christchurch.
Mr. John Henry Glazebrook, Christchurch.
Mr. Gavin George Henderson, Christchurch.
Mr. Sydney Andrew La Roche, Christchurch.
Mr. Knud Horby Marcussen, Christchurch.
Mr. William Raymond Philipson, Christchurch.
Mr. John Osborne Taylor, Christchurch.

Otago District

Mr. F. B. Belcher, Dunedin.
Mr. Harry T. Beveridge, Dunedin.
Mr. Charles K. Ellis, East Taieri.
Mr. Gordon H. Jolly, Dunedin.
Mr. Alan G. Kennelly, Dunedin.
Mr. Robert R. White, Dunedin.

Whangarei District

Mrs. Jessie H. Clark-Walker, Whangarei.
Mrs. Norma L. Lees, Kamo.

District Council Notes

WHANAGREI DISTRICT COUNCIL R.N.Z.I.H.

Meetings held monthly from February to December.

Membership has risen steadily and country Garden clubs and specialist societies are affiliating.

Attendance has been good and interest keen, country members travelling long distances—up to thirty miles—to attend meetings.

We have been fortunate in obtaining very able speakers, from various departments of the Department of Agriculture, and from the Auckland Parks and Reserves Department, as well as specialists in Fruit and Vegetable growing.

We have also had presentation of plant problems and discussion on their solution, films, and the staging of new and interesting plants.

Our new projector, showing coloured and black white films, made by our own photographer, has added interest to the meetings.

Members of the District Council have visited the country Gardening Clubs and given lectures and judged shows.

Membership now standing at 120 has made it necessary to obtain a large hall. We anticipate a much larger membership in the future as there is an intense interest throughout Northland in the 1957 Conference and show to be held in Whangarei.

A combined Show Committee has been formed and we are having a sort of preliminary canter in February of this year to help all the country Garden Clubs and other interested societies to prepare for the big event in 1957.

WAIKATO PROVINCIAL DISTRICT ANNUAL REPORT OF

It is with much pleasure that I present a most favourable report on the progress made by the Waikato District Council of the N.Z. Institute of Horticulture during the last twelve months.

The progress I refer to is not in regard to the amount of money we have made, for that is negligible in an Institute such as this: it refers to those items which really count.

Firstly—The keen interest shown by Members in the programmes and activities conducted each month.

Secondly—The knowledge gained in relation to Horticulture in all its phases from the interesting and instructional lectures delivered, and films shown.

Thirdly—The identification and naming of the numerous and varied plants most suitable for growing in our gardens.

Fourthly—The great pleasure of meeting others who are all interested in the propagation and cultivation of plants. In exchanging with them the many ideas of improving gardens both in lay-out, arrangement, design, colour schemes and selection of plants most suitable for each purpose.

Finally—No better evidence of progress could be found than in our rapid and continued increase in membership. This Council holds pride of place in the Dominion with 273 members and we hope to reach the 300 mark before very long.

NORTH TARANAKI

Labour Weekend proved as usual a happy time for members, when a bus and private cars provided transport to Wanganui where a round of visits to private and public gardens was thoroughly enjoyed. Wanganui council provided a most enjoyable film evening on Saturday. Our arrival meeting was very well attended, especially by out of town members, some of whom had long distances to travel. Mr. V. C. Davies was re-elected President and Mr. B. Norman, Secretary. The Annual Report showed a growing membership, and a very interesting and instructive year's activity. At a later committee meeting a year's programme was drawn up. also plans for the Institute's court at the Floral Festival, it was decided that this would take the form of a pioneer's garden.

SOUTHLAND REPORT

Although the Annual Conference in Invercargill formally finished at the conclusion of the Banks Lecture on the evening of Tuesday, the 31st of January, some of the delegates did not leave the city until the end of the week. On Friday the 2nd of February, the Southland District Council organised a bus trip around some places of interest to their visitors. Accompanied by our President. Mr. Houston and Mrs. Houston, a small group of delegates were able to avail themselves of this opportunity.

The itinerary was as follows. Leaving the Town Hall at 9 a.m. the party drove through Rosedale, one of Invercargill's more recently developed suburbs, and from there through Waihopai Scenic Reserve, an area of native bush under the control of the Invercargill Parks and Reserves Department.

The next stop was at Anderson Park. A gift from the Anderson family to the citizens of Invercargill, this park consists of 58 acres of ground. much of which is covered with native bush. Besides the gardener's house and buildings in the nursery and propagating department, the park also contains the beautiful home of the late Sir Robert and Lady Anderson. This is now an art gallery and under the care of the Invercargill Art Gallery Society. On arrival the party first inspected and admired the spacious lawns and colourful bedding schemes, and from there moved on to see the Southland Rose Societies trial grounds. Morning tea was served, and the delegates then had a quiet stroll through the art gallery.

About 11.15 a.m., the party left for the home at Otatara of Dr. J. G. Macdonald, President of the Southland District Council. Otatara is suburb lying to the west and nearer the coast than Invercargill. Mrs. Macdonald who was a member of the party conducted the visitors on a walk around their grounds. Shortly afterwards the Doctor arrived and both he and Mrs. Macdonald discussed with their guests the plants to be found in the bush surrounding their home. Dr. Macdonald's main interest in horticulture is in the collection and cultivation of native plants, especially trees, shrubs and ferns. He has carried out this work over a period of years, and has kept a record of his successes and failures. The many introductions which have become established make a very interesting collection in what is a comparatively small area of bush.

At 12.30 p.m. Mr. Houston thanked the hosts for their hospitality. and the party left for the city.

The History of the Royal New Zealand Institute of Horticulture

The origin of many professional organisations is lost in obscurity, so also are their original aims and objects. For this reason the Institute has cause to be grateful to the late Mr. M. J. O'Sullivan, B.Sc. N.D.H. (N.Z.) for his work in compiling the history of this Institute. The book, of some 250 pages represents a great deal of research through the past minutes of both Executive meetings and the collection of a considerable quantity of personal recollections, as well as assembling these into a coherent and extremely readable form. Besides its rather utilitarian value as a historical record, this publication serves as a memorial to the many enthusiasts who gave so freely of their energies that this Institute might be born and trained along the path of usefulness.

One cannot help but feel that this publication should be read by every member of the Institute, if for no other reason that everyone of us should have a deeper understanding of how the Institute has been evolved. Perhaps the warring factions which now threaten to cleave the Institute might resolve their differences if all parties thought anew of the aims and objects which they are committed to preserve.

It is interesting to read of how largely horticultural education has bulked in the proceedings and conferences over the last 50 years. In 1924-25, a special committee reported "Some day there will be a place in the University for a Degree in Horticulture but the Institute should grant a Diploma in Horticulture and set up an Examining Board". These gentlemen were indeed prophetic!

The National Diploma in Horticulture was finally established in 1927 and since then 171 Diplomas have been issued. either with or without examination. and many of the leaders of New Zealand horticulture feature in the list of those who hold the N.D.H. (N.Z.).

In the post war period the Institute went through a period of expansion, and while these events will be fresh in the memory of many members, it is both interesting and perhaps profitable to read of the motives and hopes which prompted the expansion. Some of the hopes have been realised, but many of the ambitions of the older members remain unsatisfied. Perhaps a perusal of this section of the history will lead us again towards these objectives.

One would wish that this work could have been printed for general distribution, but the cost of printing such a work could not have reasonably been expected to be recovered. A copy is lodged with the Secretary of each District Council, as well as with the main Libraries and members may consult these. For those who have the welfare of this Institute at heart it is stimulating reading.

This History was compiled by its Author during 1951 and 1952.

Maurice Justin O'Sullivan was educated at Thames where he distinguished himself at the High School. Becoming a pupil teacher he obtained his B.Sc. at Auckland University College. He taught at the Seddon Memorial Technical College and joined the Mount Albert Grammar School staff in 1931. When the Agricultural course was established in 1933, he took over and on the planting of the Citrus Test Area in August, 1933, assumed the charge of it for the Auckland District Council of the Institute.

He remained at Mount Albert for 14 years and after four years at Avondale College joined the Post-Primary Inspectorate. Their comment referred to his unassuming. untiring nature, his zeal, his passion for exactitude, his intolerance of cant and pretension, his puckish humour and his generosity of heart. His untimely death was a loss regretted by the whole profession.

He joined the executive of the Auckland District Council in June 1933, and remained an invaluable member until his untimely death after a short illness on 12th June, 1954, at the age of only 47.

He qualified for the National Diploma in Horticulture in 1935—his papers were excellent and also brought him the first award of the Cockayne Gold Medal.

The value of his long services to the Institute were fittingly recognised in February 1954, by his election to its highest Award. that of Associate of Honour.

N.D.H. (N.Z.)

Some confusion appears to exist in New Zealand regarding the usage of the titles N.D.H. and N.D.H.(N.Z.) The National Diploma in Horticulture is awarded by the Royal Horticultural Society in England, and those people who have passed the examinations of that Society are entitled to use the appellation N.D.H. The Diploma issued to successful students of the Royal New Zealand Institute of Horticulture is designated N.D.H. (N.Z.). Those holders of the New Zealand Diploma who designate themselves as N.D.H. assume a title to which they hold no rights, and for which they are unqualified.

Glossary

ANTHER: The pollen-bearing part of a stamen.

AXIL: The angle between the stem and the upper surface of a leaf or other organ.

BRACT: A leaf on a main flower-stalk, generally a little different from the other leaves, from whose axil a flower or its flower-stalk often springs.

CALYX: A cup formed of the outer row of the flower leaves joined together.

CANOPY: Shade.

CAPSULE: A dry fruit containing two or more seeds.

CLADODE: A branch looking like and doing the work of a leaf.

COROLLA: Petals as a whole.

DRUPE: A fruit with a soft envelope and hard seed inside.

EPIPHYTE: A plant that grows on another without feeding on it.

LOBE: Any round projection, especially on a leaf or petal.

OVULE: A seed germ still attached to the mother leaf or scale.

PARASITE: A plant that lives and feeds on another.

PERIANTH: Petals and sepals together.

PERSISTENT: Staying on after the flower has bloomed or the leaf died.

PISTIL: Stalk and stigma together of the female sex organs.

RACEME: Stalked flowers growing up a main flower-stalk.

SADDLED: Leaves astride the lower ones, as in flax.

SEPAL: A leaf of the calyx, the outer row of the flower leaves, often green.

SPIKE OF FLOWERS: Stalkless flowers growing up a main flower-stalk.

STIGMA: That part of the flower which receives the pollen grains and on which they germinate.

STIPULE: One of a pair of appendages or hangers-on borne at the base of a leaf on many plants.

UMBEL: A very much contracted raceme so that all the flower-stalks or rays seem to start from the same spot.

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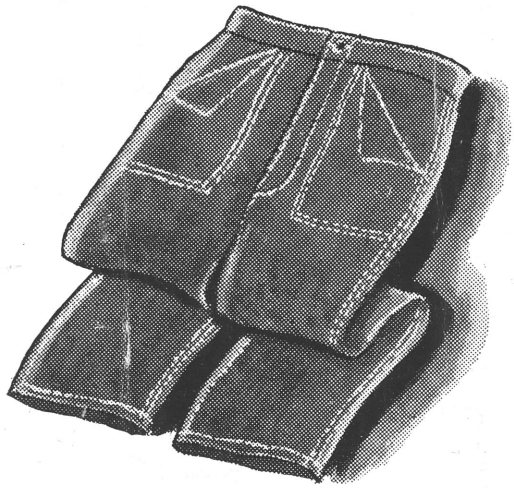

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