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CONTENTS:

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Journal of the New Zealand Institute of Horticulture

VOL. 1 WELLINGTON, JUNE, 1929 NO. 1.

EDITORIAL.

It may be said without fear of contradiction that there are in New Zealand more persons interested in horticulture in either a professional or amateur way than in any other occupation; for almost every dwelling-house has its garden plot. True, every householder is not a gardening enthusiast, but most are sufficiently interested to prefer one kind of flower to another, and to keep their gardens tidy. What is lacking to cultivate this interest is an adequate supply of useful literature. At present this need is catered for by articles in monthly periodicals and by weekly columns in the press, besides a few small handbooks. No apology is needed, therefore, for the appearance in New Zealand of a journal devoted entirely to horticulture. The distribution of horticultural literature cannot fail to stimulate interest in the subject. Such interest will naturally reflect on the demand for popular reading on horticulture, and hence it is hoped an improvement in the methods and results of the amateur gardener which must involve benefits to the industry.

The present issue, it is hoped, inaugurates the establishment of a regular journal edited under the authority of the Executive Council of the New Zealand Institute of Horticulture. The small size is due to the fact that the cost is being defrayed out of the ordinary revenue of the Institute. It is intended to publish at three-monthly intervals, namely, about the middle of June, September, December, and March. It is confidently hoped that a future increase in circulation will justify and allow of the size of each number being considerably increased. Horticulture in all its aspects comes within the scope of the Journal, and the treatment will be both from the technical and popular viewpoints, so that all who are interested in the subject should find it of value.

The New Zealand Institute of Horticulture is now well established, and has achieved some important results, especially in its educational scheme. An empowering Act was passed in 1927 and regulations thereunder gazetted. By authority of these the Institute has issued 107 National Diplomas of Horticulture. Courses of training are being defined and arranged so that the possession of one of the Institute's diplomas ensures that the holder has undergone a comprehensive practical and theoretical training in horticulture.

Another national undertaking that the Institute is interested in is the establishment of National Botanic Gardens in New Zealand. Among the objects to be aimed at are the systematic collection of native New Zealand plants, and of representative exotics, especially such as are of commercial value. The importation and acclimatisation of exotic plants, and the exchange of seeds and living plants, are also important functions of botanic gardens. They should also serve as training grounds for students in horticulture. There are certain difficulties in the way of establishing national botanic gardens in New Zealand, partly financial and partly geographical, but it is hoped a scheme to obviate these may be evolved.

The New Zealand Institute of Horticulture stands for advance in all branches of horticulture, and as an aid to increasing interest in the subject the present Journal is issued.

CHINESE GOOSEBERRY (Actinidea chinensis).

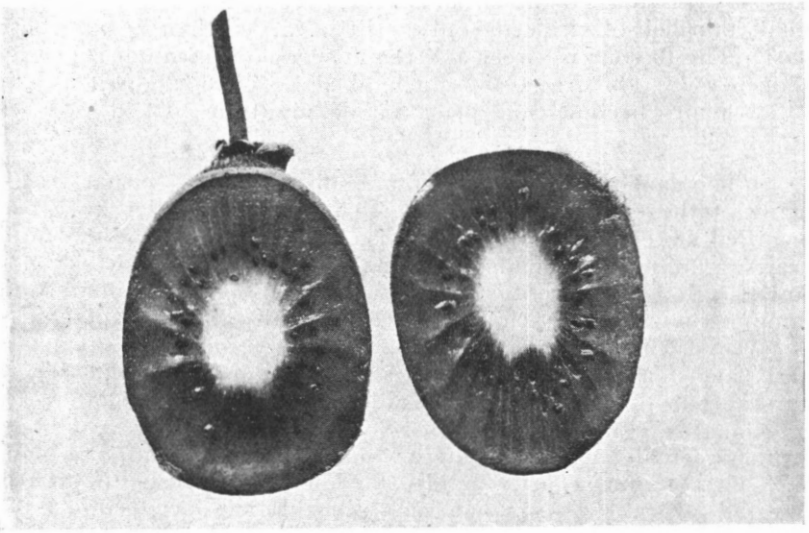
BY W. H. RICE, N.D.H. (N.Z.).

A soft fruit, suitable alike for dessert, fruit salads, jams, jellies and pies, and which matures when there is a scarcity of such, merits close attention for domestic and commercial use. Add to this a vine suitable for summer shade on fences, buildings, and pergolas, rapid in growth, not exacting as to soil conditions, with highly ornamental foliage, charming in general appearance, and of botanical interest—all these are found in *Actinidea chinensis*.

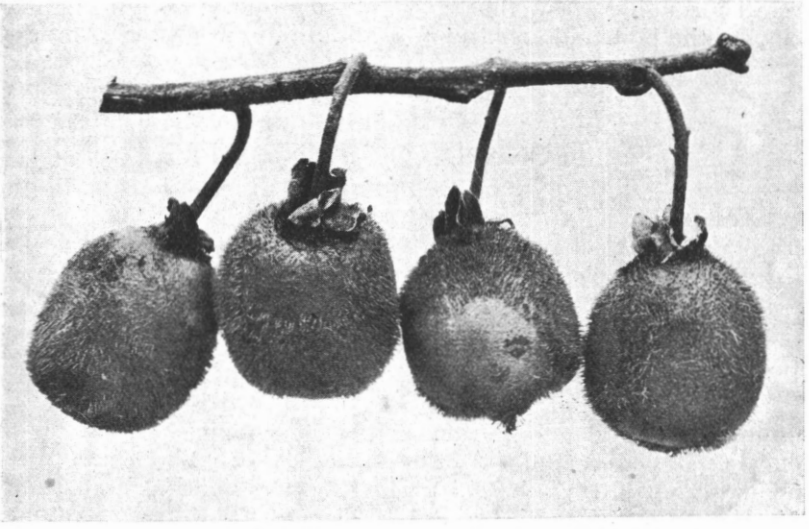
As an ornamental climber several varieties of *Actinidea* have, for many years, been in cultivation throughout the South of England and the Continent of Europe. It is rare for such plants to fruit, except *chinensis*, and this not as successfully as has been experienced in the northern part of the Dominion. New Zealand experience shows that the *Actinidea* has been in cultivation for many years, but as the first introductions were raised from seed, fruiting was rarely noted, as the dioecious nature of the plant requires a group or at least one of each sex to ensure fertility. Vegetative propagation was introduced, and a range of plants very successfully fruited at Avondale, Auckland, Feilding, and Wanganui. The plant is a deciduous climber, without tendrils but self-twining. If no supports are provided the canes interlock and wrap round each other, and though they become a dense mass they remain reasonably erect. The best type of support for commercial purposes is a permanent eight-foot fence with horizontal wires spaced one foot apart, with the rows twenty feet apart, and the plants eight feet apart in rows, with at least one plant in six a male.

For garden use the plants are ideal to furnish a pergola. In season the vine has heart-shaped leaves, six by four inches, dark green in colour with bronze under surface, thus making a very attractive combination. At the base of each leaf a node is formed

which protrudes on one side. From these nodes laterals are formed; these are usually fruit-bearing. Flowers are in season in November and December, light cream in colour, up to two inches in diameter, and gracefully pendulous on a long stem. The flowers are carried freely and are highly fragrant, but the male is the finest bloom from a floral point of view. The fruits which ripen in June



ACTINIDEA CHINENSIS. [*Photo H. Drake.*
Section of Fruit.



[*Photo H. Drake.*
FRUIT OF ACTINIDEA CHINENSIS.

are oval, 2½ x 2 inches, green, and with a soft brown rind bristled with heavy brown down. The foliage falls in the middle of May, by which time the fruits are ripe enough for harvest, though not ripe enough for dessert purposes. As the fruits are picked the down should be removed; this rubs off quite readily when the fruits are fresh, but is very tenacious as the fruits wilt and ripen. Ripe fruits are very luscious. The flesh is pale green and very seedy with small purplish-black seeds only a little larger than a strawberry seed. The flavour is sweet and reminiscent of pineapple and Cape gooseberry. The fruits are much liked by birds, though as only a few fruits become soft prior to picking time little loss is experienced.

So far plants have not been found subject to any special disease, while of the established diseases, thrip and leaf roller have been recorded under Auckland conditions. Propagation is best done by grafts, a union being made between a scion of the vine wood and a stock section of the root. A section of the root approximately the same diameter as the scion, united, tied with raffia, and planted so as to cover the union with earth, generally results in a good take. Male and female plants should, of course, be kept separate for nursery purposes in order to be able to apportion them later. An additional safeguard is to adopt two types of grafting, say, tongue graft for female and cleft graft for male. By this means the plants may with greater security be identified, as the union is distinguishable for several years. Some such precaution is necessary, as the sex of the plant cannot otherwise be determined until the flowers appear.

Actinidea Jam.—Peel the fruit, cover the bottom of the preserving pan with water, add the fruit, and reduce to a pulp over a slow fire. Thoroughly cook, then add ¾lb. sugar to every 1lb. of fruit, bring to the boil, and cook for five minutes. Such jam is of a conserve texture.

DR. LEONARD COCKAYNE, C.M.G.

It is gratifying to learn that His Majesty the King has conferred on Dr. Cockayne the honour of Companion of the Most Distinguished Order of St. Michael and St. George.

Dr. Cockayne is Past-President of this Institute, and has rendered much assistance since its inception, especially in connection with its educational work.

During his long career Dr. Cockayne's great contribution to the botanic knowledge of our time has been recognised by numerous educational bodies and scientific societies throughout the world and it is only fitting that his many services to the State should now be recognised by the King.

Our heartiest congratulations are extended to Dr. Cockayne, with best wishes for many years of continued usefulness.

PHOTOGRAPHY AS AN AID TO THE STUDY OF PLANTS AND PLANT PROBLEMS.

BY WM. C. DAVIES, Curator of the Cawthron Institute, Nelson, N.Z.

Sir Joseph Banks, in whose honour the annual Banks Lecture has been established by the New Zealand Institute of Horticulture, is an outstanding example of the highest type of public benefactor. Possessed of ample means, and endowed with vigorous health and a striking personality, he devoted all his resources to the advancement of science and the welfare of his country.

Although a man of catholic tastes and wide scientific outlook, his dominant life interest was undoubtedly the study of plants. To it he was attracted in his schoolboy days, deriving his early inspirations from a torn copy of Gerard's "Herball," and the women herbalists of the neighbourhood who helped him in the collection and naming of specimens.

Finding that Oxford afforded no facilities for botanical instruction, he obtained permission to bring from Cambridge a special tutor, whose salary was provided by the few students interested in the subject; and on the termination of his university career, not content with a tour of the Continent, and the other diversions usual among wealthy young men of his day, he showed a marked preference for unknown lands, attracted partly by the love of adventure, but chiefly by the lure of the rare and beautiful in the realms of plant and animal life.

In the Motherland, Banks's greatest claim to remembrance is his long and fruitful presidency of the Royal Society, whose fortunes he guided for over forty years. To us in New Zealand, the chief interest in the great botanist centres in his voyages of discovery in the Endeavour with Captain Cook, to which he contributed no less than £10,000, thus defraying the expenses and the cost of equipment of a scientific staff.

The selection of "Photography as an Aid to the Study of Plants and Plant Problems" as the subject of this year's Banks Lecture is peculiarly appropriate, in view of the very keen interest in the illustrative aspect of botanical science displayed by Banks himself. Of the staff of nine taken out by him on Cook's first voyage of exploration in the South Seas, three were artists whose sole work was to make permanent records of plant life and other natural features of importance. Later on, when the honorary directorship of the Royal Botanical Gardens at Kew became one of Banks's many interests, almost his first act was to engage the services of the brothers Bauer, two of the leading botanical illustrators of the day.

In all, some 800 beautiful copper plates were prepared of the specimens collected on the Endeavour expedition, approximately 200 dealing with the plant life of our own country. After lying in the archives of the British Museum for 130 years, the Australian plates were rescued from obscurity early in this century, and published through the efforts of the Government of New South Wales.

The New Zealand plates still remain in the custody of the Museum, but a few sets of the prints found their way to this country some years ago, and through the courtesy of the Dominion Museum authorities copies of some of them are shown on the screen.*

DRAWING AND PHOTOGRAPHY.

Turning now to the subject of to-night's lecture, let us consider first the comparative merits of drawing—in Banks's day the only method of preparing botanical records and illustrations—and photography, which has displaced drawing to a considerable extent.

The advantages of the first method lie chiefly in the possibility it affords of emphasizing the salient features of an object to which it is desired to draw attention, and of subordinating or altogether eliminating those of subsidiary importance. This is especially the case in dealing with details of plant histology, a few lines often sufficing to convey an idea.

A further merit of drawing is that it avoids, to some degree, the necessity for fresh unwithered material, and, in the case of microscopic work, for the preparation of perfect mounted specimens. For example, a sketch may be made from a somewhat unsatisfactory section, which would yield but a poor photograph.

The main advantages of photography may be summed up in three words: speed, accuracy, and economy. Work formerly requiring months of patient labour can now be accomplished in a few hours with the aid of the camera. Errors due to imagination or personal bias are avoided, and, not infrequently, details invisible to the eye, even with the aid of lens or microscope, are recorded on the modern photographic plate.

MENTAL ATTITUDE OF THE PLANT PHOTOGRAPHER.

Next I should like to draw your attention to a few outstanding points of importance in all scientific photography.

The first of these is a clear comprehension of the object in view in producing the illustration, and in this connection may I stress the necessity of at least a rudimentary knowledge on the part of the photographer, of the particular branch of science relating to the work in hand?

*The lecture was illustrated by over 100 lantern slides, of which a few are reproduced in the accompanying plates.

Failing previous knowledge of the subject, he should throw himself whole-heartedly into the problem, after the manner of a lawyer preparing his case. But there will be this difference in the after results. The lawyer usually consigns the technical details to oblivion when the case is over, but the photographer seldom does. The repeated sight of an image on focussing screen, plate, paper, and lantern slide, together with the concentration of thought necessary to the success of his work, usually produces an indelible record in his memory. For this reason every botanical research student should strive to become an expert photographer, regarding the camera as equal in importance to the note-book.

Ruskin, in "The Eagle's Nest," tells a story of Turner, who was one day engaged in making a drawing of Plymouth Harbour, with some ships in the distance, seen against the light. He showed his sketch to a naval officer, who indignantly pointed out that the ships of the line had no port-holes. "No," said Turner, "certainly not. If you will walk up to Mount Edgecumbe, and look at the ships against the sunset, you will find you can't see the port-holes."

"But," said the officer, "you know the port-holes are there. To which Turner replied: "I know that well enough, but my business is to draw what I see, and not what I know is there."

In art possibly it is undersirable to know what to look for—sight may be influenced by prejudice—and the same may occasionally be said of scientific observation, but the business of a scientific photographer is to know what features are to be recorded, and then to employ every available device, such as position, lighting, choice of lens, light-filter, and plate, to bring into prominence those features with which he is concerned.

The photographer should live with his subject. If a landscape, he should view it under varying conditions of light and shade, choosing his time of day or season of the year accordingly. If a living plant, the stage of development may require consideration, as in the case of the flower-heads of grasses and the fructifications of fungi.

Hardly less necessary to success is a thorough knowledge of his apparatus. Lenses, filters, plates, developers, papers—all should be the subjects of exhaustive experimental work, till their full potentialities are realized.

Then there is the question of artistic treatment of a subject. Some artists will no doubt smile at the idea of art in the presentation of what they regard as a merely mechanical record, and it must be admitted that much scientific material affords only limited scope in this direction. But art has its opportunities, even in the preparation of scientific illustrations, and they will be none the less effective for its presence.

The last, but not the least, requisite for success is infinite patience, coupled with intolerance of any but the best results. The need for these qualities is so evident as to require no further emphasis.

SCOPE OF BOTANICAL ILLUSTRATION.

Our next task is to make a brief general survey of the field of botanical illustration; and at once we are struck by the great variety of the subjects presenting themselves under this heading. Anything, in fact, may turn up, from a mountain to a microbe, and as the mountain is more easily seen and understood, let us take it first, under the title of landscape photography.

One of the most attractive features of present-day botany is that known as plant ecology—the study of plants in relation to their surroundings, including the plant forms associated with various rock and soil types.

A striking ecological study is presented by the "Mineral Belt" in the neighbourhood of Nelson—a rugged mountainous area, composed mainly of serpentine and other magnesian rocks, and covered with a soil so sterile, that it bears only the scantiest growth of tussock grass and stunted scrub. Close alongside it are the argillite rocks of the Maitai series, commonly known as "Maitai Slates," producing soil of much greater fertility, supporting an abundant forest growth. (Plate IIa.)

Another distinctive example in plant ecology is that of the salt marsh formations, so characteristic of the mud-flats of our coasts. There we have salt-loving plants or halophytes, such as the grass-wrack, the salicornia, and the rushes, aiding in the accumulation of silt, and gradually building up an extensive area of reclaimed land. This, as the salt leaches out, gradually becomes covered with pasture, the whole process providing admirable material for a set of photographs illustrating, in turn, the plant formation and associations (Plate IIb), the individuals composing them, and lastly, the changes in the pasture consequent on the gradual disappearance of the salt, together with the attendant development of bacterial life in the soil.

We turn now to the larger forms of plant life, such as trees and shrubs, with their trunks, foliage, flowers, and fruits. What a fascinating field of work is presented here, and what a temptation to display slide after slide made from favourite negatives, showing characteristic distinctions of bark, leaf, and cone.

Trees may be regarded from the aesthetic, the educational, or the economic point of view, and in connection with all three, photography has its value. In a city such as Christchurch, which, thanks to the foresight of the early settlers, is to-day noted for the luxuriance of its trees, there is no necessity to dwell on the first of these aspects. But as an example of tree-photography from the educational point of view, I put before you a few slides, selected from the transparencies of the forestry exhibit in the museum at the Cawthron Institute. (Plate III.)

Confined at present, owing to the exigencies of space, to the leading exotic conifers, this display, presenting the foliage, fruit, trunk, and whole tree of each species, seldom fails to attract the attention of visitors, and affords some slight indication of the possibilities of this class of educational photography. The services of photography as an aid to forestry have rapidly advanced during recent years. Records of forest growth, of the progress of plantations, and of the extent of damage by fire may be taken as examples of work of this kind, but it is perhaps in the direction of aerial forest surveys, especially in newly opened-up regions, such as Central Africa, that photography has proved of the greatest service to forestry.

We come now to smaller plants, photographed preferably in the studio, where in addition to freedom from wind, conditions of light and shade are under better control than in the open. Good examples of this type of subject are the celmisias, buttercups, eyebrights, and gentians of the New Zealand mountain flora; or the less spectacular, though equally beautiful little flowering halophytes to be found in salt marshes.

One of these, the Selliera, a creeping plant with small white blossoms, merits more than passing notice by reason of its unique method of pollination, described by the late Mr. Cheeseman,* and it also serves as an excellent example of a subject requiring low magnification.

The blossom may be readily recognised by its lop-sided appearance, due to the fact that the corolla is split to the base at the back, the five lobes all turning to the front. On dissecting a young flower-bud almost ready to expand, there will be found surmounting the style, a small cup-shaped covering, known as the indusium, in the base of which is hidden the still immature stigma, while surrounding the style and slightly above it, the five stamens form a circle. Just before the blossom is ready to burst open, the stamens arch over the indusium, the anther-cases split along their inner sides, and the pollen falls into the open indusium below. Then the corolla-lobes commence to separate, the style elongates, and the stamens, curving backwards, find their way through the posterior opening. (Fig. 1, Plate VIIb.)

Figure 2 shows the lobes in their final position, and the indusium inclined towards the front of the flower.

Meanwhile the stigma, approaching maturity, forces its way through the indusium, carrying the pollen before it and depositing it on hairs surrounding the cup, to be removed later by insects in search of nectar. The last stage in this interesting process is the pollination of the mature stigma by later insect visitants.

As a further example of photography of educational value, we cannot perhaps do better than spend a few moments with the grasses, selecting slides from a set illustrating their natural history. (Plate IV.)

*The Fertilisation of Selliera, by T. F. Cheeseman, Transactions of N.Z. Institute, Vol. IX., page 542.

On examining the base of the leaf of a barley-plant you will observe at the junction of leaf-blade and sheath, two small ears or auricles, appendages characteristic of several of the common grasses, including the ryes, the barley-grass, and the couch. Looking at a similar specimen of wheat, we again find auricles, but in this case bearing a number of hairs, which are absent from the barley. Rye also has these ears, but very much smaller, and without hairs, while the oat has no auricles at all.

Here is a simple method of distinguishing immature plants of these four cereals, a method which can be demonstrated in no more effective way than by means of photographs of moderate enlargement.

Subjects even more striking are the inflorescences of grasses, with their feathery stigmas, and their dainty anthers poised on slender filaments—seen in all their beauty for a few brief moments, the time of day varying according to the species, and then, having discharged their pollen, shrivelling up and floating helpless in the morning breeze. So delicately balanced are the anthers that, in the case of the spikelet of meadow-foxtail, shown in Plate IV, the vibrations set up by the wings of a blow-fly in a distant corner of the studio, were sufficient to cause oscillation, and removal of the insect was necessary before photography could proceed!

No branch of scientific investigation lays greater claims to the services of the photographer than mycology; and of the very varied specimens dealt with in the studio none presents greater beauty and diversity of form than the fructifications of the native fungi three examples of which are shown in Plate V.

Less attractive, but of infinitely greater economic importance, are the pathogenic fungi, organisms such as those responsible for black spot, Irish blight, the various rusts, and other pests of the orchard, farm, and garden. Representative of this class of work is the series in Plate VI, dealing with the life cycle of the brown-rot fungus, which levies so heavy a toll on the peach and other stone-fruit crops.

To the casual observer the first indication of the presence of the disease is the actual rotting of the fruit in summer, as seen in Fig. 1, whereas the primary infection is that of the blossoms, the cycle being continued by spore-producing cankers on the stem (Fig. 5) till the fruit begins to ripen.

Pustules on the surface of the affected fruit keep up a supply of spores (Fig. 1a) which spread the work of destruction, the fruit meanwhile shrivelling up and forming "mummies." These perpetuate the disease through the winter, giving birth in the spring to the delicate fungus-cups (seen in Fig. 3) which send forth the spores causing the spring infection.

Mycological illustration frequently presents features—such as the spores referred to above—involving photography under higher magnification, with the aid of the microscope.

The photomicrographs of sections of totara and red beech, in Plate VII, supply an instance well-known to students of forestry, of the value of microscopic structural features in determining the identity of timbers, liable to confusion by non-experts. Perhaps the highest development of this branch of the art is reached in photographic records of the most minute forms of vegetable life, such as diatoms and bacteria, work offering scope for perfect apparatus and the utmost care in manipulation.

These then, are a few representative examples of the leading types of photography connected with the study of plants and the investigation of plant problems.

May I refer, before leaving this branch of the subject, to the great variety of work which may arise from the consideration of one problem?

Take, for example, the scientific treatment of a poor soil, that of the Moutere Hills, in the Nelson Province, to ensure the profitable growth of pasture, crops, or orchard trees—an investigation which has occupied the attention of the soil-chemists of the Cawthron Institute for several years. An adequate set of photographs would include—(a) landscape views of the undulating country with its characteristic vegetation; (b) records of the results of manuring and liming experiments conducted in pots and cylinders and in the field; (c) illustrations of the growth of cover-crops and of their benefit to the subsequent crop or orchard development (see Plate VIII); (d) results of experiments in the inoculation of soil with nitrogen-fixing bacteria, to promote the healthy growth of leguminous plants as cover-crops; (e) effects of top-dressing of pastures with lime and phosphate, including records of the general appearance of the pastures, the details of the herbage, the improvement in the numbers and physique of the stock carried, and healthy development of the bacterial population of the soil, an invariable accompaniment and promoter of soil fertility.

SOME ASPECTS OF TECHNIQUE.

With this long but by no means exhaustive list of the by-paths along which one problem may lead the investigator and the photographer, we close our survey and pass on to the consideration of methods having a special bearing on the photography of plants, dealing first with the outdoor treatment of vegetation.

The first requirement is absolute stillness, which, excepting on rare days, can be secured only in the early morning, seldom later than nine o'clock. It is indeed possible, with rapid plates and a wide aperture of lens, to make instantaneous exposures, but generally only with the sacrifice of both detail in the shadows and the depth of focus secured by "stopping down."

Early morning work provides the additional advantage of suitable lighting, especially in the summer time, the almost horizontal rays of the sun throwing the foliage into relief, and bringing into prominence structural features which lose their distinctive characters later in the day.

Te secure "living" pictures of landscape, plant associations, or trees, bright sunlight is necessary; but in dealing with subjects like trunks, branches, or foliage, at close quarters, a soft light, filtered through the clouds gives a more satisfactory result. Detail in the bark of the shaded side of a bole is difficult to secure when the other half is in the sunlight. (Plate IXa).

In photographing trees in confined spaces an indispensable requisite is a wide-angled lens. But so also is a lens-hood, which prevents extraneous rays of light from the sky finding their way through the lens, striking the bellows, and being reflected thence on to the plate, where they produce a flare patch, such as is seen in Fig. 1, Plate IXb.

COLOUR VALUES.

Equal in importance to lighting-conditions in botanical photography are correct colour-values. These involve a problem bearing not only on the presentation of blossoms with their endless diversity of hues, but also on the varied tints of forest, plantation, and pasture, ranging from palest shades of green to the flaming yellow, orange, and scarlet of autumn.

It is impossible to deal, beyond the barest outline, with this phase of the subject, which, adequately treated, would provide material more than sufficient for a separate lecture.

The limiting factor in the presentation of coloured objects is the degree of sensitiveness of the photographic plate to the colours of varying wave-length which, as you are aware, constitute the spectrum of white light; the primary colours being red, green, and blue-violet, with the intermediate orange and yellow, blue, and indigo. Beyond these visible components of white light there are at one end of the spectrum the infra-red rays, and at the other the ultra-violet, neither affecting the human vision.

The oldest photographic plates, used in the collodion wet-plate process, and sensitive chiefly to violet light, gave results quite remote from a truthful rendering of colour values, skies being invariably depicted as pure white, while red, yellow, and even green, appeared as black.

The first dry gelatine plates, which superseded the collodion, included blue as well as violet in their range of sensitiveness, but it was not till the beginning of the present century that real progress, due to the discovery of the effect of certain dyes on the gelatine emulsion, was made in the manufacture of colour-sensitive plates.

The first of these, erythrosine, extended the range of sensitiveness to green and yellow, making possible the so-called orthochromatic plates, while later the use of the isocyanine dyes produced an emulsion capable of recording in monochrome all the colours of the visible spectrum.

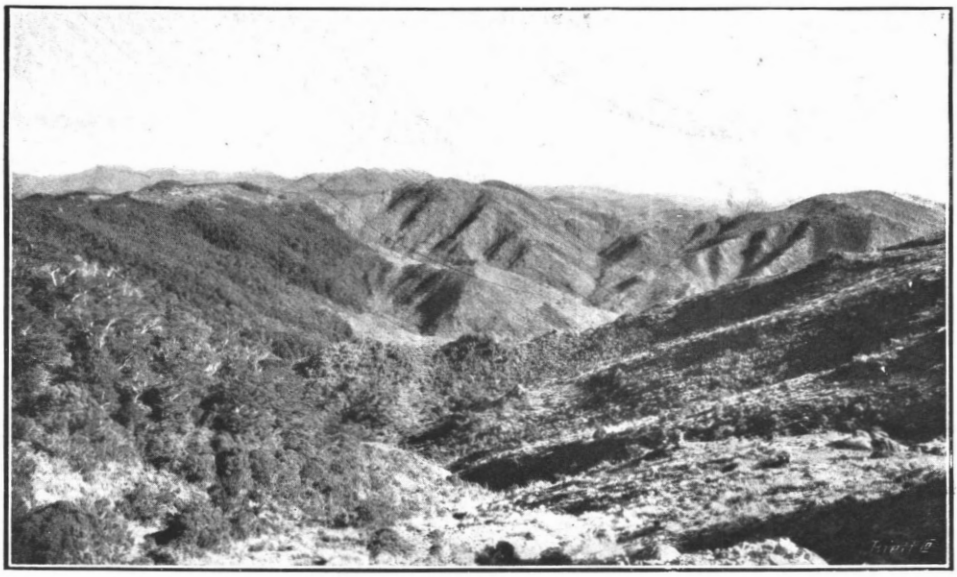
This emulsion, the basis of the now well-known panchromatic plates, is, in common with all other plates and films, still unduly

PLATE I.

THE RIGHT HONOURABLE SIR JOSEPH BANKS, P.R.S.
From a portrait by Thomas Phillips, R.A.

PLATE II.

TWO ECOLOGICAL STUDIES.



(a) THE HEAD OF THE RODING VALLEY, NEAR DUN MOUNTAIN, NELSON.
Note on the right, the stunted vegetation of the serpentine country ("Mineral Belt") and on the left, the beech forest on soil derived from Maitai Shales.

(b) SALT MARSH FORMATION ON MUD-FLAT AT WAKAPUAKA, NELSON HAVEN.
Salicornia meadow, with belt of Juncus on right and Manuka scrub association on left.

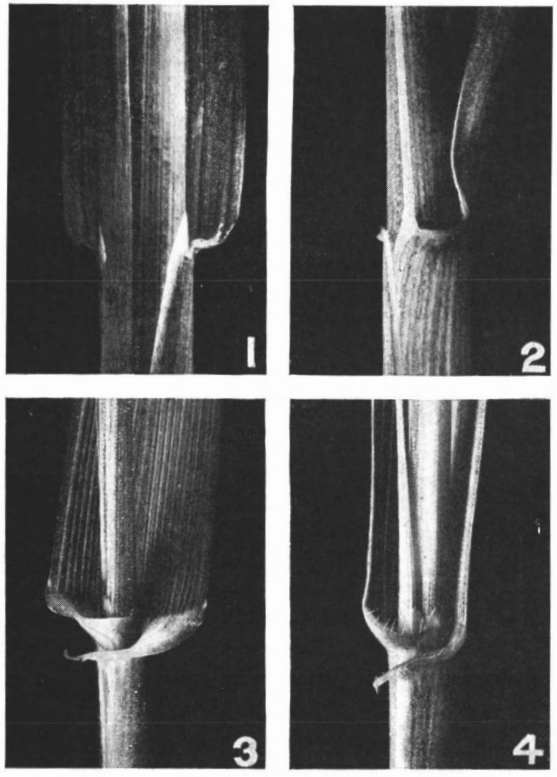
PLATE III.

EXOTIC CONIFER STUDIES.

COMPACT UPRIGHT CONE OF WEBB'S FIR.
(*Abies Webbiana*).

OPEN DROOPING CONE OF BHOTAN PINE.
(*Pinus excelsa*).

PLATE IV.



(a) LEAF DISTINCTIONS OF COMMON CEREALS.

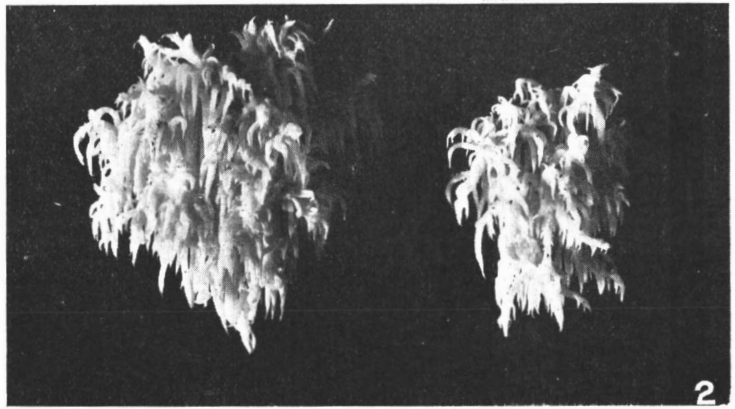
(1) Base of leaf blade of Oat, without ears or auricles. (2) Rye, with small auricles. (3) Barley, with large auricles. (4) Wheat, with hairy auricles.

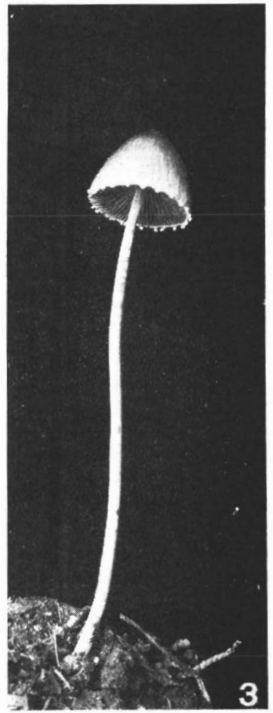
(b) STAGES IN THE FLOWERING OF MEADOW FOXTAIL.

(*Alopecurus pratensis*).

(1) Spike-like panicle with stigmas extruded. (2) First anthers appearing. (3) A single spikelet of Foxtail, showing first appearance of anthers. (4) The same spikelet 20 minutes later, with anthers balanced on fully extended filaments.

PLATE V.

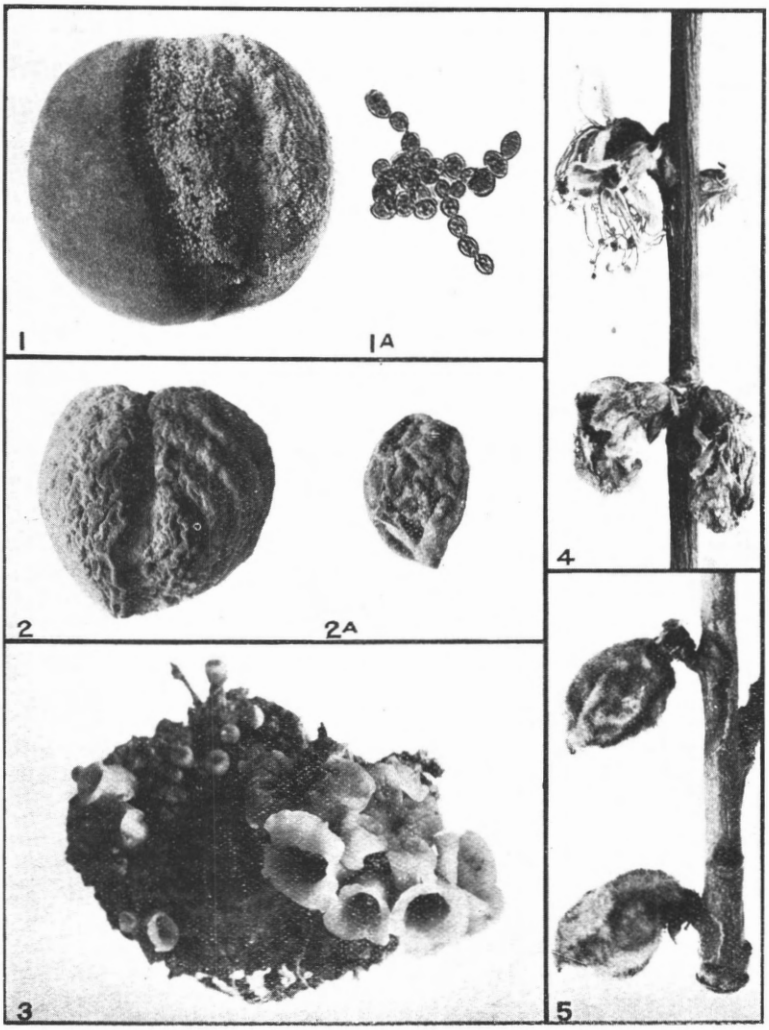




THREE OF THE NATIVE FUNGI OF NEW ZEALAND.

(1) A group of Scaly Toadstools (*Lepiota rhacodes* (Vitt.) Fr.)
(2) A Toothed Fungus (*Hydnum* sp.).
(3) A variegated-gilled fungus (*Panaeolus sphinctrinus* Fr.)

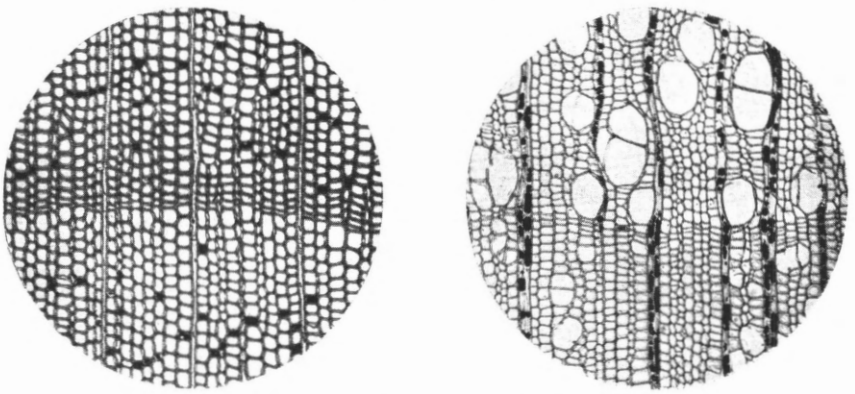
PLATE VI.



BROWN ROT FUNGUS WHICH ATTACKS THE PEACH AND OTHER STONE FRUITS.

(1) Ripe fruit showing ravages of the disease. The tufts or pustules on the surface of the fruit produce the summer spores. (1A) Photomicrograph of summer spores (X80). (2) First and last stages in mummification of diseased fruit. (3) "Mummy" in the spring, bearing fungus-cups from which issue spores causing blossom infection. (4) Infected blossoms. (5) Stem canker at junction of fruit and stem, perpetuating disease during summer.

PLATE VII.

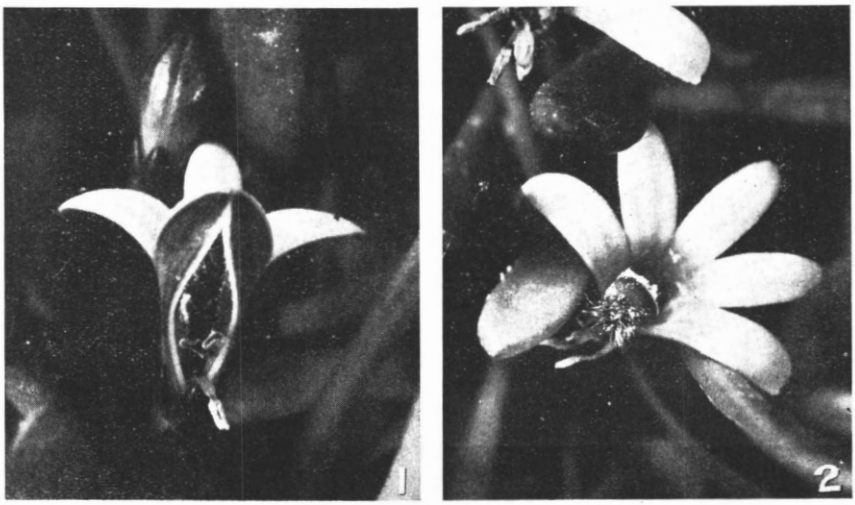


MICROSCOPIC STRUCTURE OF TIMBERS.

TRANSVERSE SECTIONS X 40 diameters.

Note the large vessels in the Beech section, distinguishing it from the Totara.

Left—Totara (Podocarpus totara). Right—Red Beech (Nothofagus fusca).



TWO STAGES IN THE FLOWERING OF SELLIERA RADICANS.

A common plant of salt marshes.

Left—Blossom partially open—rear view. Anthers having discharged their pollen into the indusium, are curling backwards through opening. Indusium turned towards front.

Right—Blossom fully open ready to receive insect visitors. Dead anthers below. Indusium turned towards front.

PLATE VIII.

RECORDS OF SOIL IMPROVEMENT.

EFFECT OF LIME AND SUPER. ON MOUTERE HILLS COVER CROPS.
1, 3, 5 untreated. 2, 4, 6 manured.

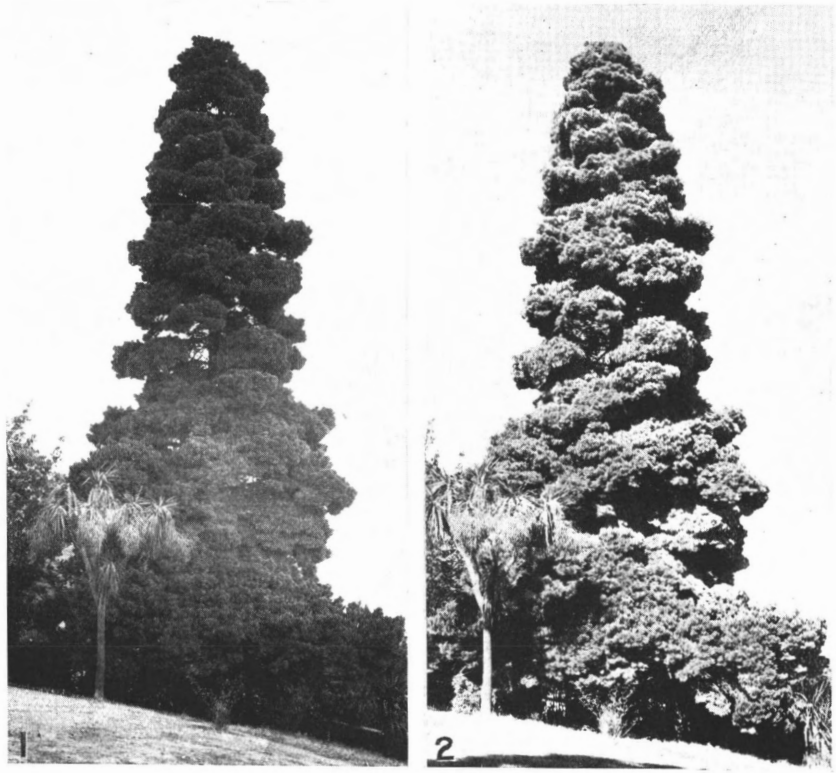
OAT CROPS FOLLOWING ABOVE MANURED COVER CROPS (Without further manure).
TREATMENT: (1) Untreated, (2) Summer fallow (no manure), (3) After Lupins,
(4) After Horse Beans, (5) After Tares.
CROPS: No. (1) 10 cwt. per acre. No. (5) 115 cwt. per acre.

PLATE IX.

EXAMPLES OF FAULTY AND CORRECT LIGHTING OF TREES.

(a) TRUNK OF PINUS EXCELSA.

(1) Photographed in bright sunlight. The shaded side lacks detail.
(2) Effect of soft light, on cloudy day.

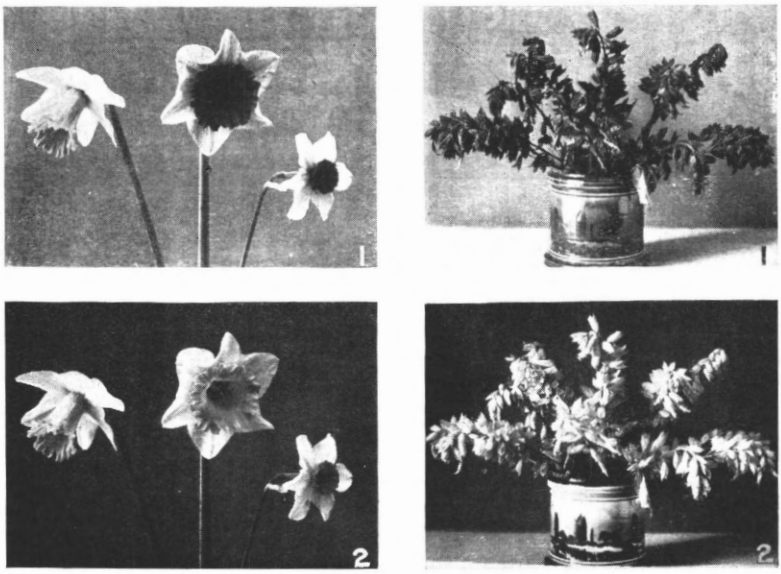


(b) PINUS CONTORTA.

(1) Taken on dull day, without a lens hood. Note the "flare patch" on the lower portion of the tree.
(2) Bright sunlight serves to accentuate the characteristic tier structure of the tree.

PLATE X.

PANCHROMATIC PHOTOGRAPHY.



(Left) NARCISSI WITH CREAM, YELLOW, AND ORANGE TRUMPETS AND WHITE PERIANTHS.

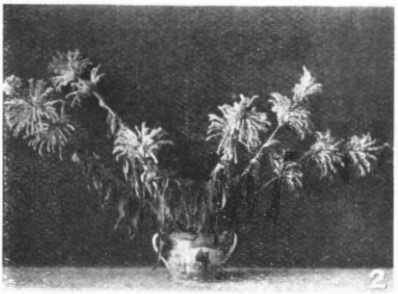
(1) Taken on an ordinary plate. (2) On a panchromatic plate without a light filter.

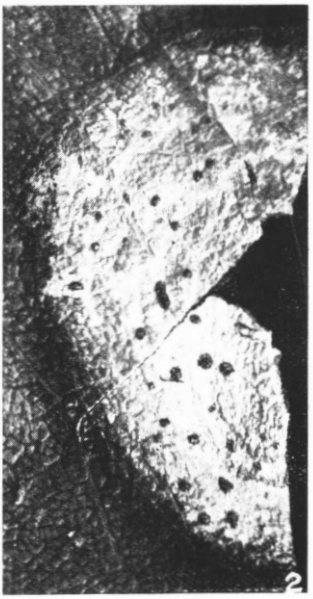
(Right) SCARLET SALVIA, IN YELLOW AND ORANGE JAR, WITH DARK TREES.

(1) Photographed on an ordinary plate.

(2) On a panchromatic plate with yellow (K_3) filter.

PLATE XI.





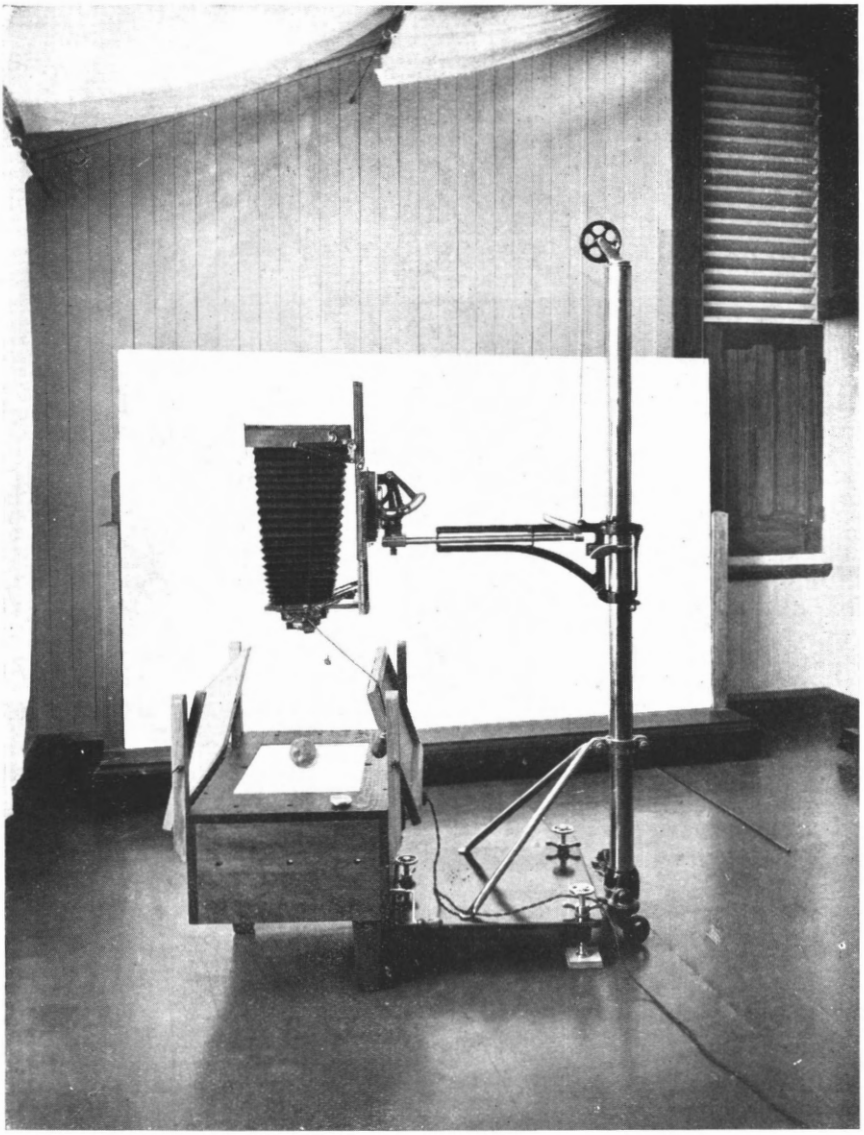
(a) (Left) ORANGE SALVIA (LION'S TAIL).

(1) On an ordinary plate. (2) On a panchromatic plate, with yellow filter. (3) On a panchromatic plate, with red filter. No. 2 gives the correct colour value of flower, foliage and vase. No. 3 gives excessive contrast, due to over-correction.

(b) (Right) STEM AND LEAF OF A "LAWYER" (*Rubus Cissoides*) ATTACKED BY FUNGAL DISEASES.

Taken on panchromatic plate with red filter. The light portions are the diseased areas, brown in colour, the dark parts the healthy green tissue.

PLATE XII



VERTICAL CAMERA STAND CONSTRUCTED FROM X-RAY TUBE STAND. WITH OBJECT STAGE PROVIDING A TRANSLUCENT BACKGROUND, ELECTRICALLY LIGHTED.

affected by the blue end of the spectrum, in addition to recording a portion of the ultra-violet rays. It is therefore necessary, in order to obtain a photograph registering correct values for all the colours, to place before, or behind, the lens a yellow filter or screen. This, by depressing the intensity of the blue, violet, and ultra-violet rays, permits the green, yellow, and red rays to influence the latent image formed in the plate in the correct proportions, thus producing a result approximating to the impression registered by the human eye.

The illustrations in Plate X demand little explanation. In the case of narcissi, the correct treatment is that shown in Fig. 2, there being no need to use a yellow light-filter, which would only tend to unduly equalize the tones of trumpet and perianth. The scarlet salvias in the same plate require no comment, the tones in Fig. 2 giving clearly a more correct and pleasing rendering of the subject.

Light-filters may be used not only for the purpose above indicated, but also with the object of producing a maximum contrast. Thus, in Plate XIb, which illustrates the case of brown patches on a green leaf and stem, due to the activities of a fungal pest, what is required is a striking contrast between the green and brown areas, together with all possible detail in the diseased regions—a result best attained by the use of the red-light filter, which was unsuitable for use with the orange salvia shown on the same page. The method is analagous to a not uncommon weakness in human conversation—exaggeration in order to attract attention.

With this short introduction to the methods and possibilities of panchromatic photography we must rest content. Those desirous of a deeper acquaintance with this subject, or its later and even more alluring development, colour photography, which opens up so wide a field in the portrayal of plant life, will find abundant material, both in the literature of the photographic trade and in such works as "The Photography of Coloured Objects," by Dr. Kenneth Mees.

STUDIO EQUIPMENT.

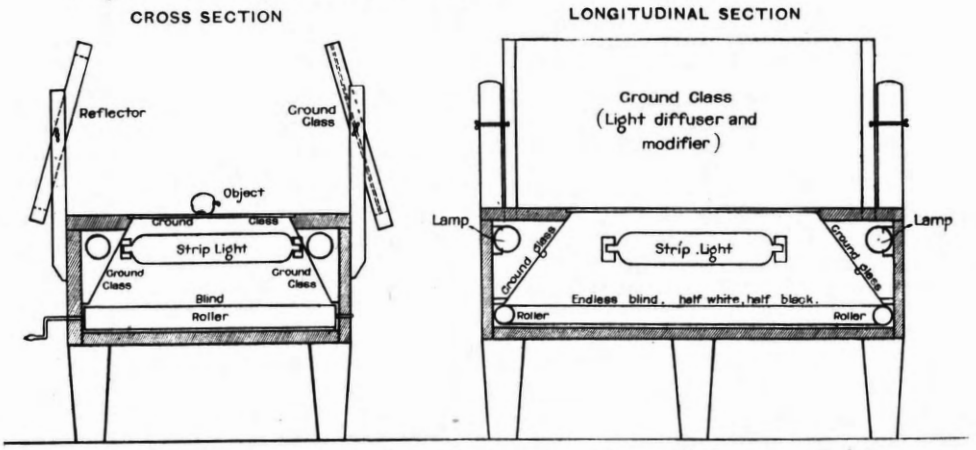
The concluding remarks on technique will deal briefly with a piece of apparatus, indispensable in the studio treatment of plant specimens—a vertical camera stand. For many years there have been on the market varied and efficient cameras for photomicrography, but up to the present scant provision has been made for the photography of larger objects, best dealt with in a horizontal position, and requiring perhaps, a slight degree of magnification.

Most nature photographers have re-invented such a device for themselves, sometimes with a thumb-screw and slot, sometimes with pulleys and counter-poising weights to provide the necessary adjustment.

The form of appliance found most serviceable by the author is the adaptation of an X-ray tube stand figured in Plate XII. The usual foot has been replaced by a solid iron casting with rubber-

tired wheels. Three anchoring screws are provided, by means of which the instrument can be levelled and firmly supported, stability being further ensured by two steel stays attached to pillar and base.

The adjustable attachment by which the camera is secured to the rising and falling arm, enables the operator to move his instrument in any direction, or set it at any angle, while, though not absolutely rigid, the apparatus is sufficiently steady to permit magnification up to three diameters.



The object stage, also shown in Plate XII, and further illustrated in the text figures, has proved a most useful adjunct to the vertical camera, its main purpose being the provision of an easily controlled white background.

The apparatus is simple, consisting of an electrically-lighted box with a ground glass top, which may be supplemented when necessary by a sheet of opal glass to further modify the light. At the bottom of the box is an endless background, half white and half black, running on rollers and operated by a handle, while at the ends and sides are four strip lights, such as may be seen in the angles of a jeweller's window, the light from each being diffused by a pane of ground glass.

It frequently happens that a dark object requires a long exposure to secure detail, while a comparatively short exposure will suffice for the white background. The mode of using the apparatus is almost self-evident. The well-illuminated background requires only a short exposure, a few seconds generally sufficing. The light is then switched off, the white side of the endless blind is replaced by the black, and the exposure proceeds to completion.

Evidence of the effectiveness of the combined camera and object stage is presented in the series of illustrations in Plate VI, all of which, with the exception of the photomicrograph of spores, were produced in the manner just described.

In conclusion I wish to express my thanks to the Cawthron Trustees for their generous assistance towards the cost of the illustrations; also to my friends and colleagues, and particularly my assistant Miss Kirby, for valuable help in various directions.

HORTICULTURAL WORK FOR SPRING.

BY WM. C. HYDE, N.D.H. (N.Z.).

These suggestions are offered to those who have the care of the home garden, whether it be large or small, and they are specially applicable to the ensuing months of July, August, and September.

The climate and soil of New Zealand, with its varied scenery, offers easy opportunity for making garden homes of unexcelled beauty, comfort, and economy. These opportunities are frequently neglected with the airy excuse of "no time," but it is being gradually demonstrated that the pleasure and use of a well proportioned garden will more than compare with other attractions. This discovery has no doubt been delayed by wrong methods that have proved a great burden without adequate results, and to avoid a repetition of such disappointments it is necessary first to study very carefully the size, design, and kind of garden best suited to the locality, the family, and the home. Without this preparation much good energy, money, and enthusiasm may be wasted in building up a garden that is incongruous or two expensive or laborious to maintain. It is possible to plan a small garden, or even a large one, on simple lines that will require very little labour to maintain and yet form a very gracious, comfortable, and useful environment for the home.

> "Not every land can nourish every tree.
> Rivers are fringed by willows; alders grow
> In thick morasses; rocky hills give birth
> To barren mountain ashes; myrtle groves
> Grow strongest by the shore; while Bacchus loves
> An open imminence, and yews prefer
> North winds and cold. . . . ."
>
> —The Georgics of Virgil.

The writer of the above lines was not only a sweet singer, but was raised and skilled in husbandry. Much has been learned since his day, but the fundamental facts, in which the people of those times were well grounded, are too often forgotten at the present day.

The main factor in easy and successful horticulture lies just in that one fact of choosing trees (also shrubs and herbs) that are suitable and adapted to the land in which they are to be planted. What that may be must be learned by enquiry, reading, or observation. A broad generalisation of this principle is to make the main garden features, in warm localities with a good rainfall where native bush grew originally, of native trees, shrubs, and plants. In the high mountainous country of the South Island the conifers of Northern Europe and America may predominate, while in other localities the exotics that make Christchurch and similar localities so English in appearance are most suitable. Good planting on these lines gives admirable results in very short time.

SHELTER BELT.

The most important feature in the home garden is the shelter belt, which protects the homestead from prevailing winds, and forms an effective background for the house and tempers the climate for the smaller things growing in the sunshine of the leeward side. Until the end of August extensions or replacements in this belt may be planted when the ground is sufficiently dry. After that period there is some risk of losing the young plants, except perhaps in the wetter localities or seasons. Merely to skim two or three feet with a sharp spade, break up the soil, and place the young plant in position at the back of the spade with a lever action, is often sufficient. For larger subjects more preparation is needed.

In many cases the margins of the belts need consideration. In natural bush, such places are thickly set with shrubby growth that breaks the under-draught, and is also an admirable fire-break. Many belts of this kind would be greatly improved with such plantings on the windward side. Even amongst the trees themselves an undergrowth of shrubs suited to the conditions keeps the ground moist, and so is often a great benefit even to the larger trees which overshadow them.

Trees in this section may include some that have an added interest and utility in producing nuts, such as chestnuts, hazel, and stone pine. The hazel is thrifty in the coldest localities here, while the stone pine, with its moderate height and rounded top, is a useful shelter tree about the smaller gardens, and provides edible seeds for which the retail price is about three shillings per pound. This is not mentioned here as a commercial proposition, but merely as evidence of the quality of the nuts.

Such plantations should now receive any attention they may require in the way of thinning, the removal of dead branches and trees, etc. All such timber and trimmings should be removed and burnt or properly stacked ready for any purpose for which they may be useful. To allow them to remain and rot is to provide a home that will breed pests that may attack the growing trees. Needless to say all trimming should be carefully done, making the cut close up to a main limb or growing lateral, so that the wound will heal quickly. In the case of rather large cuts it is well worth while to apply a coat of tar or paint to prevent decay.

ORCHARD.

In the home-garden orchard the vegetables are sometimes grown in the alleys between the trees. This is a very undersirable arrangement, as it is against the interests of both crops. Something of the kind may be done successfully while the trees are small, but once they come into bearing it should be discontinued; while at no time should the vegetable crop be planted so close as to interfere with the tree roots.

We are now right in the middle of the pruning season, and good work done with clean, sharp, pruning shears and saw, will go a long way towards securing a bounteous crop that is pleasant to see and useful too. Young trees will require hard and careful pruning to ensure vigorous growth and shapely. Mature trees will require little, if any, heading back. Please remember that. A little thinning of crowded tops, and careful consideration of the fruiting laterals which clothe the permanent framework of the tree, may be advisable. In cases where the base of the tree is inclined to become bare and unprofitable, growth should be encouraged by cutting back any laterals there may be, to "wood" buds, to encourage growth. If that policy is pursued, and the top kept open, that barren condition of the base will be avoided.

Then follows spray-time, when the trees must be conscientiously covered with a protective coat of chemical wash to keep them from the attacks of black spot and other fungi. One or two applications in spring-time are most important, and do 80 per cent. of the work required. Experience has shown that these applications are best delayed until the trees begin to show the first signs of growth, when a Bordeaux spray of 6.4.50 formula should be applied, and as the flower buds begin to break another at a strength of 3.4.50. There is extraordinary virtue in these sprays, and they should in no case be omitted on pip and stone fruit-trees. Those who have had little experience and do not understand the above abbreviations should ask the district Orchard Instructor of the Department of Agriculture to call when he is in the locality. He will be pleased to give instruction, and leaflets that will make these mysteries plain.

". . . Knotless trunks are opened with the axe,
And deeply cleft with wedges; then insert
A cutting big with promise, and behold!
A mighty tree, with furniture complete,
Goes forth to greet the sun, and stands aghast
At foreign leaves and fruit she cannot own."

—Ibid.

This is a translation of a 30 B.C. version of the operation of grafting, the season for which commences just as the sap is rising, but a little late rather than too early. Unprofitable varieties of apples and pears can be worked over in this way to varieties that are useful. The first step in the operation is to collect the necessary scions or grafts at pruning time—young one-year wood, well ripened, and about the thickness of a lead pencil. Tie them together in a bundle, label them plainly, and bury them for half their length in friable soil in a shady situation. The cleft grafting described by the poet still has its advocates, but the more popular way is by means of crown grafting, that is, to cut off the branch just above a length of "knotless " wood, slit the bark, and slip in a shaped scion between it and the wood. At least two should be inserted in a branch of any size. The details may be seen in any horticultural work, but the secrets of success are to have good scion wood, per-

form the operation at the right time, and use a very sharp knife. Unless a special knife is available, the knife used should be specially ground and whetted. Where rather large trees are under operation some of the smaller and lower branches are allowed to remain to act as a check on the rush of sap. In any case growth below the scion will be made, and it should not be unduly checked the first season. After a foot or so of such growth it is sufficient to merely nip out the growing point and remove the growth another season when the graft is established. One more precaution—do not make the grafts unduly long; two buds above the tie are sufficient.

FLOWER GARDEN.

A garden is incomplete without flowers: they are Nature's calendar; but the cautious gardener will rely very much for these on trees and shrubs. In bush districts the yellow kowhai and white clematis will mark the springtime, and red kaka's beak, pohutukawa, and ribbonwoods will follow. In less favoured localities yellow forsythia and red japonica, to be followed with lilacs, blue, purple, and white, luburnum, and the roses of summertime, and scented philadelphus; while autumn leaves will brighten the picture until the daphnes, heather, and rhododendrons of winter appear.

On these lines the flower garden requires a minimum of attention once the plants are established. A little judicious pruning of crowded branches is almost all that they require.

Rose pruning, however, is a rather more intricate affair. In localities of late frosts this operation is deferred until late in the spring, say about the month of September. The exceedingly hard pruning methods of a former generation are not now practised here to any extent. A selection of well-placed wood, as young as possible, is retained and shortened back. This eliminates all the weak and old wood as far as possible, and opens up any crowded branches. In shortening back it is best to select well placed buds for the terminals, to give the bush symmetry and an open centre. After pruning, when six inches or so of new growth has been made, it is advisable to go over the bushes again and thin out the new growth, as it is often too crowded to give the best results. With a good soil dressing of blood and bone manure lightly turned in, very fair results should then be obtained; three to four ounces to the square yard is a generous dressing.

Those who wish to go a little further in the cultivation of flowers and raise a batch or two of annuals for summer bedding should sow their seeds in wooden trays, and place them in a heated frame about the end of the month of August or early in September. A bed of glowing zinnias or fragrant stocks is a luxury for those who have the time to give them attention, and the necessary means and methods for doing so are not so elaborate or difficult as they often sound. In this mild climate it is often sufficient to place a foot or so of well packed stable manure inside a cold frame, and on it place the seed boxes and put the glass sashes in position. For this

purpose the manure should be fresh, and prepared first by placing it in a compact heap to ferment. After four to five days it should be turned, shaken out to mix it well, and dry portions watered and stacked up compactly again. Repeat this operation a second time, and then after a similar interval it should be placed in position in the frame. There it should be left for three or four days with the sash lights off. It should then be watered well and the sashes put in position, and it is ready to receive the seed boxes. The frame should be kept rather close until the seeds are up, when more air must be given. "Damping off," through the attack of fungi of different kinds, and frost, are the two worst dangers liable to be met. The first is due to keeping the frame too hot and close, and the second, of course, is caused by allowing low temperatures to obtain access to the plants. The first mentioned trouble is usually the greater, as growers are inclined to force the growth unduly, but hard stocky plants will give the best results, and 55 degrees to 60 degrees F. is warm enough when the frames are closed. Should it rise above this the frames should be aired. Any tendency for it to fall below that temperature when the frames are closed should be met by covering the frame with mats. This, however, will not often be needed, certainly in the northern areas, if the position is dry and well sheltered, as it should be. The few seed boxes will not take up much room, but as soon as the seedlings make rough leaves they must be pricked out and lightly watered in and placed back in the frame; the accommodation then will be fully occupied. Tomatoes, egg plants, and Chili peppers are good things that may also be raised in this way.

VEGETABLE GARDEN.

The home gardener with a limited area usually desires to grow all classes of vegetables in the one season, and if time and labour are available that is well. But in small areas the proper treatment for a good rotation of crops is difficult to carry out under such conditions, and in its absence many troubles arise. In such cases the work is much simplified and the results better if the grower is satisfied with less diversity. The area may be divided into two sections, the one to be heavily dressed with stable manure —or a good cover crop turned in—for growing cabbage, cauliflower, salads, spinach, peas, etc., and the other trenched for tap-root crops. Another year the treatment may be reversed. This work should be done now in preparation for the sowing and planting season, which commences towards the end of July.

In larger gardens, and in the country, it is good economy to have an enclosed garden near the house for the more permanent crops, such as asparagus, rhubarb, herbs, small fruit, seed beds, and frames, and to grow the remaining vegetables in a piece of land of such a size and shape that it may be easily ploughed, and which permits the use of implements of the Planet Junr. class, or even

horse implements in some cases. In the country most of these crops may be raised in conjunction with some classes of root crops. Under such a system the work is much less laborious and there is much saving of time.

In the case of asparagus we have a popular vegetable that is available at a season of shortage—September, October, and November—and if it were known how easily it may be grown in this country it would be more generally and largely planted. Our traditional methods are based on the clay soils of the Homeland, but on the loose alluvial soils here, in which it is quite at home, it may be generally grown on the flat instead of the conventional raised beds. Plants may be raised by sowing seeds in a bed of rich soil, and starting them as early as possible to secure maximum growth, and so obtain good plants for planting out into permanent beds the following season. As the seed is slow in germinating it should be soaked in warm water the day before planting. Sow in drills 12 to 18 inches apart, covering the seed with an inch or two of soil. When established thin the plants to four inches apart. An ample sowing should be made so that all weaklings may be discarded when transplanting.

If beds are to be planted this season the work is generally done in the month of September, and in preparation the land should be thoroughly trenched and heavily manured now without any delay. When planting, open trenches 10 to 12 inches deep, and set the plants 15 to 18 inches apart. Plant only good strong plants, and cover them with about two inches of soil at first. This will leave an open trench that will mark the row and gradually fill in as the plants grow and hoeing operations are carried out. When filled the plants will be covered with five or six inches of soil. For the home garden the rows should be 18 inches apart and the plants three feet alternately.

Established beds should receive a dressing of one ounce each per square yard of superphosphate, nitrate of soda, and kainit, in the month of August, repeating the nitrate dressing a month later.

ORANGES AND LEMONS IN NEW ZEALAND.

By Geo. A. Green, N.D.H.(N.Z.).

EARLY HISTORY OF CITRUS IMPORTATIONS.

The writer has been unable to discover the date of the first introduction of sweet oranges and commercial lemons into New Zealand or by whom introduced. It is, however, known that in the very early days of settlement the lemon and some of the well-known varieties of sweet oranges were brought in. It is believed that as early as 1850 the Lisbon lemon was growing in the City of Nelson, and in Motupipi, near Takaka. Old lemon trees were growing in East Clive, Hawke's Bay, and near Napier, a few years

later; while at Kawau Island, Auckland, and in the North named varieties were growing at least from the 'fifties of last century, while before the treaty of Waitangi was signed it is said that citronelle (rough lemon) and sweet orange seedlings were growing in various parts of North Auckland.

Sir George Grey, who was responsible for the introduction of so many useful trees and plants—many of a sub-tropical character—is known to have had a large and varied collection of citrus fruits at his island home at Kawau. Amongst the citrus trees was the original tree of the variety now known as the "Poorman" orange, that useful breakfast fruit which is also so highly esteemed for marmalade and preserving. It was not, however, until the early 'seventies that there appears to have been any commercial planting of citrus varieties. Small plantings were made about Tauranga, Auckland suburbs, Warkworth, and Whangarei.

SOME EARLY COMMERCIAL GROWERS.

In the very early days, probably about the year 1860, the late Mr. Booth is said to have been one of the first to introduce and plant in the Tauranga district several named varieties of sweet oranges and lemons. In quite early times the late Mr. Reader Wood, at one time M.P. for Parnell, had a grove of very fine lemons in his grounds off Brighton Road. At Whangarei, Monsieur R. Tefler, a French settler-storekeeper, planted a grove of orange and lemon trees, quite early on. These were in full bearing in the 'seventies, and it was the vigour of the trees and the quality of the fruit which induced Mr. H. Dobbie to plant, in 1881, both orange and lemon trees extensively in Whangarei. This grove was about 20 acres in extent and included such varieties of oranges as Navels, Paramatta, Blood, St. Michael's, and Poorman, also lemons. Mr. Dobbie informed the writer that one season the crop of sweet oranges exceeded 130 tons, or over 6,000 cases. These found a ready market at an average of 8/- per bushel case, which, considering values at the time, was probably above the prices realised for imported oranges from the islands or Sydney. It is stated that the colour of the oranges was superior to the best Australian. For flavour they were better than those from the Mediterranean, while they had less "rag" than those from the best island oranges. At that time lemons were hard to sell owing to overseas competition and the same applied to the Poorman orange. Outside competition prevented the steady development of the orange and lemon industry at that time. It is only in recent years that the lemon industry has been stabilised as a result of improved methods of packing and curing, and a small protective duty.

The Poorman industry has also established itself and the fruit is now recognised as of outstanding value for marmalade and a most useful breakfast fruit. It promises to be an industry of great economic value.

The orange industry has, however, to be revived, and in view of the fact of the high prices ruling for a large part of the year and the value of the orange imports there appear to be large possibilities in sweet orange culture if the right varieties and right type are planted in suitable places.

MODERN METHODS.

With the progress of the Dominion, the methods, the varieties, and root stocks used in other countries have been made the subject of study. Much investigation has been carried out by private individuals who have interested themselves in the matter. Just prior to the establishment of the New Zealand Institute of Horticulture work was started in connection with the nurseries in the selection of the best types of propagating material. In citrus fruits this was practically confined to lemons.

The curing of the lemon on scientific lines demonstrated, if demonstration was needed, that there was a great need for selection of true types, if the best results were to be secured from the curing, packing, and grading. A committee representating the citrus nurserymen, the citrus growers, and the Auckland Council of the New Zealand Institute of Horticulture was set up to carry on the work of securing improved types. In the early part of 1928 a small initial grant was secured by the Institute from the Department of Scientific and Industrial Research; this it was decided, should be spent to start citrus bud selection and root-stock testing work under the committee above named. The writer who had been engaged on this work voluntarily for some years, was placed in charge, with Mr. W. H. Rice of the Horticulture Division cooperating. Suitable arrangements have been made. A plot containing 1,000 root stocks in four varieties has been planted, propagating materials in oranges and lemons from the best pedigree trees in America, Australia, and New Zealand have been assembled, while further supplies have been arranged for, for the budding season of 1929-30. Already a number of young trees in most varieties chosen are in hand and others are in course of preparation. Thus it will be seen that the materials are being prepared for the production and supply of a considerable number of citrus trees from the world's best available pedigree stock. These will no doubt be used to plant out in approved selected places under strict cultural and test conditions and they should in time be the basis of the materials from which the future lemon and orange groves of New Zealand will be planted. The steps already taken, if effectively financed and carried out to their logical, scientific conclusions, should have a very decided economic bearing on the development of the citrus industry in the Dominion.

THE ROYAL HORTICULTURAL SOCIETY.

A SYNOPSIS OF ITS AIMS AND FUNCTIONS.

The Royal Horticultural Society was established in 1804, and was granted its first charter in 1809, under which it worked until its present charter was granted on the 9th July, 1928. Its membership has always been extensive, but under the late Rt. Hon. Lord Lambourne increased from 14,400 to 26,600 during the last ten years. Its receipts from subscriptions for 1928 amounted to over £41,000.

The principal activities of the Society may be considered under the three main headings of Wisley Gardens, Shows, and Publications. WISLEY GARDENS annual expenditure runs to over £15,000, and is probably the premier horticultural research and general garden in the world. The trials of garden plants have assumed a new aspect since the establishment of the standard collections, which comprise a large range of old and new varieties of each group, each year growing side by side. These collections consist of asters, aubretias, cistuses, crocuses, dahlias, delphiniums, freesias, fuschias, gladioli, helianthemums, bearded irises, lachenalias, nerimes, paeonies, phloxes, roses, veronicas, and violas, to say nothing of those for the fruit and vegetable trials, while other collections are gradually being gathered together.

THE SHOWS of the Society are held every fortnight in its own halls in Vincent Square, though the great shows in Chelsea Gardens in May and Holland Park Gardens in October have world-wide reputation. Admission on the first day of the five at Chelsea costs 10/- each. At the present time numerous exhibits from all these shows are being selected for the Wisley trials, after which final awards are made.

THE SOCIETY'S PUBLICATIONS run to a large bulk during the year. The Journal (issued free to fellows) is always well crammed with valuable horticultural information and articles of interest as well as full reports, when available, of plant trials, conferences, show proceedings, etc. Curtis's Botanical Magazine has been taken over, and is now regularly published.

Other activities of the Society consist in the teaching of candidates and the holding of examinations for the National Diploma of Horticulture and other certificates; the care, management, and augmentation of the Lindley Library; the conduct of analyses; inspection of gardens; financing collecting expeditions; and generally anything that can be said to encourage horticulture.

INSTITUTE NOTES.

Diplomas.—To date 107 Diplomas in Horticulture have been granted, including four by examination under "Group C" and one to the holder of a recognised "foreign" diploma.

Students.—Forty-four students have registered for the Institute's horticultural course. Most of these are beginners, of whom some will have qualified to sit for the preliminary examination in November next, while a few have qualified for the intermediate and final examinations.

Classes.—In the four principal centres classes suitable for the Institute's students are operating. Owing to the limited number of students offering in the smaller centres it has not been possible to start classes. The Examining Board has under consideration the possibilities of a correspondence class to meet the needs of students away from the larger cities. If this scheme is found to be practicable it should prove of great benefit to country students. In most of the principal centres the Technical Schools are providing suitable classes, while in Wellington the Workers' Educational Association is providing classes in biology and horticulture.

Plant Registration.—The Executive Council has set up a subcommittee to inquire into the question of plant registration and bring down proposals which will assist to protect the growers of new varieties of plants.

District Councils.—Towards the end of 1928 a District Council was formed in Hawke's Bay, and promises to develop into a strong and useful branch. Similar action has been taken in Southland, where considerable enthusiasm is being shown. It is hoped that the sub-division of existing districts which are too large for effective working will result in increasing the strength and usefulness of the Institute. The Auckland District Council continues to function vigorously, and is doing much useful work along educational lines, the preservation of native bush, etc.

National Horticultural Congress, London, 1930.—It is proposed that the Institute be represented, by an officer of the Government if available, and failing that by an officer of the British Ministry of Agriculture.

Combined Horticultural Conference.—At the last annual conference of the Institute the Executive was authorized to go into the question as to whether arrangements could be made to secure an annual gathering of the various horticultural interests, such as the New Zealand Horticultural Trades' Association, the Superintendents of Parks and Reserves, and this Institute. At the forthcoming conference in Auckland proposals will be submitted to enable the proposed gatherings to be held.

DIPLOMA IN HORTICULTURE (without examination):

"The Institute may, without examination, grant diploma under this Act (New Zealand Institute of Horticulture Act, 1927), to any person not less than forty years of age, who has practised horticulture for not less than 20 years, and who, in the opinion of the Institute, is qualified to receive such diploma."

The issue of Diplomas under this provision terminates on 21st October, 1929.

DIPLOMA IN HORTICULTURE (by examination):

Group C.—Open to those engaged in the practise of horticulture for a period of 15 years prior to 31st December, 1929. Oral examination only. The issue of Diplomas under this provision terminates on 31st December, 1929.

Group B.—Open to those engaged in the practise of horticulture for less than 15 years prior to 31st December, 1929. Full examination prescribed, but certain service qualifications may be waived. The issue of Diplomas under this provision terminates on 31st December, 1929.

Group A.—For students who commenced the practice of horticulture since 21st October, 1927.

All correspondence and applications to be forwarded to

Dominion Secretary, N.Z. Institute of Horticulture,
G.P.O. Box 1237, Wellington.