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Banks Lecture

TREE FERNS AND OTHER FERNS.

(By Professor H. B. Kirk.)

The Banks Lecture was instituted by the Royal New Zealand Institute of Horticulture to honour the memory and work of Sir Joseph Banks who, first of all great scientific men, visited New Zealand and made known to the older world the features of its wonderful vegetation. The Institute has had from Dr. Allan a particularly interesting lecture on the life and work of this outstanding pioneer in Science. I shall, therefore, give but a brief outline of his career. Banks was born in London nearly two hundred years ago, on 13th February, 1743. At the age of 21 he inherited the great possessions of his father, M.P. for Peterborough. Two years later he led a scientific expedition to Newfoundland and Labrador and brought back a wealth of specimens of plants and insects. There was then holding the office of surveyor of Newfoundland and Labrador a naval officer already marked for greatness, James Cook, with whom Banks was presently to be so closely associated. When, in 1769, Cook set out on his first great voyage to the Southern Seas, Banks accompanied him in the ship Endeavour, with a scientific Staff,—Dr. Solander, 14 draughtsmen and servants all paid by him and in quarters the cost of which was borne by him. Cook's wonderful success as a navigator had as one of its important factors his recognition of the value of green vegetables to counteract the dreaded disease scurvy. It was the practice, throughout the expedition, for the scientific staff to be among the first to land and return with a supply of fresh vegetation. No little of Cook's great success depended on the work and knowledge of Banks and his staff. Banks made, again at his own expense, preparations for accompanying Cook's second expedition to the Southern Seas, but circumstances arose that prevented him. He devoted the preparations he had made to a voyage to Iceland. During the rest of his life he applied himself mainly to the working up of the vast amount of material that he had collected and to the duties that fell upon him as President of the Royal Society. Of this Society he had been elected a fellow when no more than 23 years of age. He was elected President in 1778 and held that high office till his death in 1820. His great services to Science and to the State were recognised by the conferring of a baronetcy. As

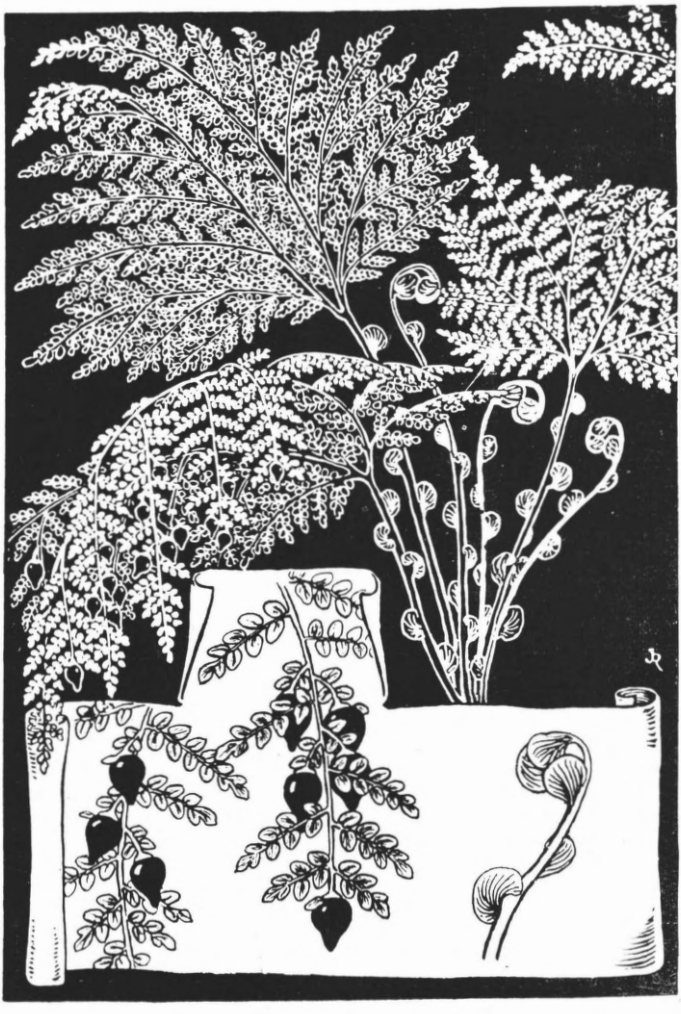
the founder of New Zealand Botany he has been fully presented to you by Dr. Allan. This, then, is a brief reference to the man whose life and work we honour to-night.

The lecture on this occasion will contain little that is original and it will not even aim at giving a continuous idea of fern structure and fern history. It will aim rather at giving the dramatic features of that most interesting history; further, it will not ignore its great evolutionary interest.

If we should carry ourselves back many a million years (say 180,000,000) to the times we call mid-Devonian we should find ourselves looking upon vegetation very different from that with which we are familiar to-day. Already life has been many and many a million years upon the earth, and plant life, leaving the water and becoming established upon the land, has reached a complexity of form and structure that foreshadow the achievements of the ferns and flowering plants of later times. Here let us take up a position as near as we can to what, after countless ages shall have passed, the undreamt of creature Man shall come to call the Muir of Rhynie in Aberdeenshire. Yonder is a worn mountain of no great height, its sides blotched with coloured earths, red and brown and white; the mountain not so unlike what that same undreamt of animal shall come to call Maungakaramea in New Zealand. Round the foot of the mountain, sluggish water gathers and flows off in a stream. The waters are richly charged with silica and other salts and the effect of them is seen in the zone of whitened remains of the low vegetation that from time to time has established itself along the banks. The same vegetation is flourishing where we stand, the plants crowded together, for the most part less than knee-high. The stems are partly woody and they are green. The stems of some species have leaves, mostly small and pointed. Here and there we find taller plants, branching freely and perhaps shoulder high. In places there are clumps of these weird shrubs and they may even form scrub patches of great extent.

As we contemplate this strange landscape, we find ourselves falling forward through the ages till we reach again the stage of Man, and of Man that has been upon the Earth so long that he has become what he calls civilized, not realizing how far he has to go before that term can justly be applied.

A scientific observer (Dr. Lang) interested in the past history of life upon the Earth, is looking at the stone in the walls of a dyke at Rhynie and is delighted to see the remains of plants such as we, at the end of our long flight into the past, saw about us on that weird moor on which we stood in mid-Devonian times. He recognizes them as the wonderfully well-preserved and abundant remains of plants of a group already known only by remains, few and fragmentary. From time to time, the moor on which we in fancy stood, had been flooded by the silica-charged water, killing the living things and receding, leaving the vegetation to be renewed. Examin-



Neuropteris heterophylla

Neuropteris heterophylla, a seed-fern from the Carboniferous. Scott's Extinct Plants; drawing by Miss Janet Robertson. With acknowledgment to Messrs. Macmillan and Co., Ltd.

ation and study show that these plants were among the earliest of those that, in time earlier than the mid-Devonian, had slowly evolved through long, long ages from the plants, doubtfully related to those we call mosses and liverworts, that first must have made the passage from water to land. Psilophytales we now call these successful land plants that we saw in fancy on the moor. They seem to be the first plants that ever achieved the formation of woody tissue, tissue characterized by the deposit of lignin in the walls of cells that are lengthened and modified so that even when they are dead they shall give strength and conduct water up the stem. This double achievement it is that made possible the evolution of taller and stouter plants and so of forest trees.

These Rhynie plants, far as they had advanced, were still very rudimentary as compared with most ferns and with the flowering plants of to-day. To begin with they had no roots. The part that held them in the ground and that drew from it water, charged with raw material necessary for the formation of food, was in structure little different from the stem and was indeed an underground stem such as now we call a rhizome. It constituted a storage organ for starchy food that the plant had manufactured as many rhizomes do to-day. These plants were, of course, provided with chlorophyll, the green colouring matter in virtue of which green plants are able to manufacture their food by aid of the energy of the sun's rays. Many of them had this substance confined to the stem, being completely leafless, as some plants are to-day.

From these simple plants there were evolved, along different branching lines, the countless forms of club-mosses, ferns and flowering plants that we know to-day.

Directly or indirectly there sprang from the Rhynie plants a number of diverging groups, some of which have died out completely. One group is represented by the practically leafless Psilotum, a species of which is known to ramblers on Rangitoto Island. Another group that held a proud place in the Palaeozic vegetation, especially that of Devonian times, was that of the club-mosses, or Lycopods; and another, that of the Equisetums, the survivors called to-day horse-tails or Dutch-rushes. Most important, the ferns and the long extinct seed-ferns, from which the flowering plants have sprung.

Ferns are shade-loving plants for the most part and one of their outstanding features is the great size of their leaves, as compared with the rest of the plant. The large size of the leaves and certain features of structure and development are, by some workers, held to show that what we call their leaves are in reality branches. Everyone has noticed that the fern leaf, when it first appears, has its apex coiled inwards, in what is called circinate or crozier-like fashion, and that this coiled portion unrolls and lengthens. Evidently the growing region is at the apex. If you cut the grown leaf across it does not lengthen; but if you cut the grass leaves on your lawn they grow again. They have a basal growing point.

We must leave on one side the consideration of the means by which branching in woody plants has been brought about. Our first idea of ferns is that branching seldom occurs: but if we have regard to the fact that the stems are for the most part creeping and often underground we shall recognize that branching is very prevalent in very many ferns. Thus the bracken fern (Pteridium aquilinum) of which we have a variety eaten by the Maori and called aruhe, has the creeping stem hidden, freely forking and giving off roots and leaves. Only the leaves rise above the ground.

In many other ferns, species of Blechnum and of Polypodium for example, these branching and creeping stems cling to the trunks of the forest plants, climbing by means of their clinging roots, their fronds often hanging gracefully and constituting a rich clothing to the trunk and branches of the supporting tree.

Among ferns that have assumed the liane habit, a very beautiful and remarkable example is furnished by Lygodium (mange-mange). It climbs not by means of roots, but by tendrils, as many flowering plants do. But this plant has an interest beyond its method of climbing. We see what appears to be long, wiry stems, twenty or thirty feet it may be in length, giving off beautiful palmately divided leaves. But if we follow out one of these wiry stem-like structures and examine its build and its behaviour, we find that it is not a stem but the greatly elongated midrib of a leaf bearing these palmate leaflets. The stem creeps in the ground and gives off these unique leaves as the aruhe gives off its much shorter and more rigid leaves. The younger parts of these leaves may turn about their support and the stalks of the leaflets may act as tendrils.

If we examine such a fern as Blechnum discolor or B. Frazeri we find that it often turns upward and assumes the habit of a small tree fern.

In certain cases the branching rhizome may give rise to branches that rise in succession into the air, forming upright trunks and often constituting clumps or small tree-ferns of different ages as in Dicksonia squarrosa. The majority of tree-ferns, however, do not spring from rhizomes, but the stem, with the rudiments of its first leaves, seeks the air from the first. The trunks of tree-ferns do not often branch. When they do so, the process is usually one of dividing into two or more forks, as is well shown in a beautiful photograph by Mr. Gray of a branching specimen of the mamaku (Cyathea medullaris) well known to ramblers on Kapiti.

The giving off of lateral branches, as distinct from forking, is not a characteristic of tree-ferns; but it occurs in some cases, especially in some species of Dicksonia. This occurs not infrequently in natural conditions. It is very often seen where, in a suitable climate like that of New Plymouth, tree-fern stems are used to form a retaining wall. If the soil be not too dry, buds may be seen emerging from many of the leaf-gaps. It is not a rare sight

that the top of the wall becomes fringed by a line of tree-ferns each springing from one of these adventitious buds.

The formation of lateral branches from an old stem is a matter of great evolutionary interest. We have referred to the fact that in Palaeozic times there had arisen, probably from the ferns, the seed-ferns (Pteridospermeae). The two groups were for a long time contemporaneous. The seed-ferns became extinct, but they had blazed the trail on which the modern flowering plants (seed-plants) found themselves.

In both the ferns and the seed-ferns branching was brought about dichotomously, by forking of the apex, which forking might be repeated again and again. Many a million years ago the seed-plants, descendants of the seed ferns, did, for the most part, adopt another plan. That plan was to lodge in the axils of their leaves groups of undifferentiated cells, and these groups had the power to develop, often after many years, into lateral branches. This discovery by the seed-plants is taken advantage of by everyone that prunes a rose-bush or an apple tree. Long ages passed before the ferns began to make, quite independently, it would seem, the same discovery. Few of them have made the discovery and none of them have yet developed it very far. What they yet may make of it may be seen, perhaps, by the descendants of Man, truly rational beings, we may hope, in some far distant age.

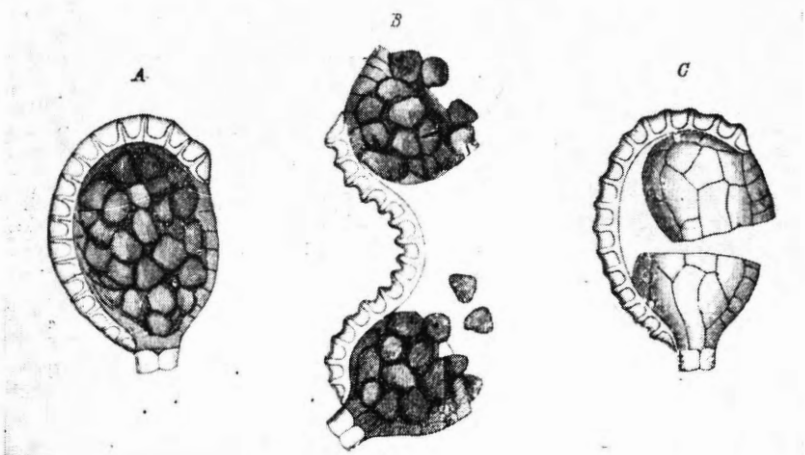


Fig. 227.

Dehiscence of a Fern-sporangium (Pteris, sp.). A. Ripe, but still intact, sporangium. B. Sporangium dehiscing. Annulus curved outwards and about to recoil; most of the spores still unshed. C. After the recoil of the annulus; all the spores ejected.

From Haberlandt's Physiological Plant Anatomy. With acknowledgment to Messrs. Macmillan and Co., Ltd,

SPORES AND SPORE-CASES.

Like all plants, ferns exhibit some of their most striking peculiarities in connection with their method of reproduction. Like all plants from the mosses upwards and like most below the mosses, they exhibit the phenomenon of alternation of generations. This phrase indicates that the plant developed from a fertilized egg-cell does not itself produce either egg or sperm but sexless spores. Each spore will give rise to a plant that will develop, not spores, but egg or sperm or both. To the sexual plant the term gametophyte is applied; to the sexless, spore-bearing plant the term sporophyte. In the ferns the two phases are distinct plants: in flowering plants the gametophyte is permanently parasitic on the sporophyte. Therein lies one of the most interesting differences between the ferns and their allies on the one hand and the flowering plants (seed-plants) on the other. We are to-night almost limiting our attention to the sporophyte generation of the fern.

On the back of the frond of most of the ferns that we know well there are clusters of spore-cases variously arranged and the clusters variously protected in their earlier stages by folds or upgrowths of the tissue of the frond.

The structure of the sporangia or spore-cases is at its highest development in the more modern ferns, such as Asplenium. It is worth while examining its structure and working, for it is a very perfect piece of mechanism whose perfection is the result of evolutionary experiment through long ages of the past.

Each spore-case is a thin-walled capsule containing a number, often 32 or 64 of minute spores. The spores are sexless reproductive cells. If you take a number of small seeds, say, of sweet pea, and place them between two largish watch glasses, you have a rough model of the actual spore case. The walls of the spore-case itself are only one cell thick. There are accessory parts, the most important of which is the ring or annulus. Also the spore-case is mounted on edge on a longer or shorter stalk. It is the annulus that calls for our special attention. It consists of a chain of simple cells round the edge of the spore case. In the working part of the annulus each cell has its basal wall much thickened and highly elastic. The two end walls, those that form party walls between cell and cell, are wedge-shaped, the narrow edge directed outwards. The remaining walls of the cell, that is the two sides and the outer wall, are thin. As the spores within the spore-case mature, the living protoplasm of the annulus cells breaks down and the cell walls enclose water filling them completely. Not all the cells of the annulus are so fully developed, for in one place the thickening of cell walls is slight and there the ring may be torn by the interesting means we are about to consider.

THE SCATTERING OF THE SPORES.

Should you place on the stage of the microscope these tiny clusters of spore-cases and under condensed light watch them through a low power, you will see that their beautiful shape and delicate tinting make them objects of surpassing loveliness. If the spores are mature you may be surprised by sudden unannounced movements accompanying the bursting of some of the spore-cases and the scattering of the spores, as though you were looking on at the sudden outburst of a volcano, and you can make this more violent by the warmth of the breath. How is this being brought about? The explanation will be more readily given if we follow in imagination a simple experiment depending on the cohesion of water and the breaking of that cohesion.

Leaving the microscope, let us imagine here a length of glass tubing perfectly clean inside—and by perfectly clean we mean just that and nothing less. Across one end is a piece of highly elastic rubber. At the lower end you have a rubber attachment for a stout syringe or a sucking pump. Completely filling the tube is water that has been boiled or distilled and in which, therefore, there is no bubble of free gas. Now draw upon the syringe and, as you succeed in drawing a very little water from the tube, you see that the rubber cap at the other end of the tube is becoming concave, dragged down by the action of the syringe at the other end. What you are doing with the syringe tends to break the adhesion between the water and the rubber cap and by dragging the water molecules apart to break the cohesion of the water column itself. You are a very strong man if you can cause an actual breakage. But if, instead of using a syringe you use a very strong suction pump, or if you make use of a column of mercury to drag upon the water column, then suddenly you may see the water column break and a considerable part of it seems even to fragment, spaces appearing in it and finding their way upwards. Part of the water has vapourized and the vapour fills the spaces. The vapour wants more space than the water did and so the rubber cap, which had been dragged into a concave shape suddenly shoots outwards and becomes convex.

Let us now apply the facts shown in our experiment to the water-filled cell frameworks of the annulus. We have seen that the lower wall of each is greatly thickened and that the two end walls are greatly thickened in their lower part. The thickening becomes gradually less in their upper part. All the free walls are thin, namely the two side walls and the upper wall. As the spores within the spore-case come to maturity the water that now fills the cell-framework of the annulus cells is slowly withdrawn by evaporation through the three unthickened walls. As the volume of water slowly lessens, it still retains its adhesion to the thin walls and tends to drag them inward. Just so when we first drew upon our syringe did the rubber cap at the top of our

tube slowly sink inwards. In the annulus the drag is resisted by the elastic walls of the cell-framework and so the outer parts of the thickened end walls begin to approach each other and the thickened base becomes compressed and bulges inwards, an elastic spring resisting always the constantly maintained compression. Evidently the result of this action taking place in each of the cells is a gradual shortening of the annulus as a whole, and so a constantly increasing strain on the thin side walls of the spore case. Presently the part of the annulus where the walls are unthickened gives way and the annulus bends backwards, tearing the two thin walls of the spore-case right across and carrying the upper part of the spore-case with its contained spores backward with it. This is the end of the first slow and steady movement that results in the rupture of the spore-case and the exposure of the spores. The movement corresponds to the phase of our experiment in which we strain at the syringe and drag the elastic cap inwards but do not succeed in overcoming the cohesion of the water.

The spores, exposed to the air, gradually dry and some may fall out or be shaken out, but the second movement, sharp and even violent, that is to result in the scattering of the spores is still to come.

The water in the cell-framework of the annulus cells continues to evaporate. Suddenly in many of them a point is reached at which the strain upon the elastic parts becomes stronger than the cohesive attraction of the water; cohesion is overcome and spaces occupied by water vapour appear. The vapour wants more space than did the water that formed it. Thus the contents of the cell no longer oppose the elastic tendency of the thickened walls but re-inforce it. Each cell in which this happens resumes suddenly its original shape by the forcing apart of the outer part of its end walls. The annulus suddenly lengthens and brings the upper part of the spore-case down upon the lower or upon the surface of the frond itself. The spores are scattered in all directions and the movement is often so violent that the annulus itself and parts of the spore-case fly off to a distance, it may be, of inches.

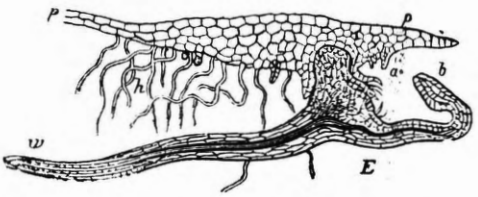
As breakage of cohesion does not always occur in all cells of the annulus at the same time, this movement may in many cases occur again and again. Moreover an annulus that has been fully spent may be made to operate again by being soaked in water and then dried.

The movements of the annulus, it will be seen, are in no way vital movements. The living cells have manufactured a mechanism that will not come into operation until after their death.

It is only in the more modern ferns that we have the spore-case equipped with an annulus so perfect as that which we have described. There still survive many ferns in which the annulus is not a ring but a group of cells with thickened walls, forming part

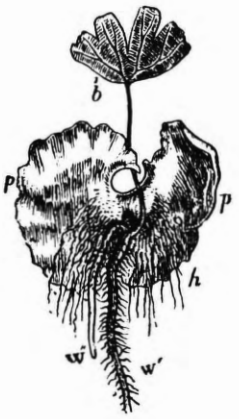
of the wall of the spore-case itself. And many of the stages between this simple form (as in Todea) and the elaborate form (as in Asplenium) still are to be found.

This brief study of the fern as a mechanical engineer is far from exhausting the subject. The annulus is but one example furnished by this wonderful group of plants of that slow discovery and achievement that constitute evolution. And it is of no little interest to note that the flowering plants, in modifying greatly whatever may have been the original method of dispersal of spores, never hit upon the idea of the annulus though they have retained the idea of the use of cells, with special wall thickenings. These in bringing about the splitting of spore-cases (anthers) make use of water in a slightly different way, the consideration of which lies beyond the scope of our subject.



Adiantum Capillus Veneris

Longitudinal section through the prothallium pp and the young Fern E; h root-hairs, a archegonia of the prothallium, b the first leaf, w the first root of the embryo. Magn. about 10 times.



Adiantum Capillus Veneris

The prothallium pp seen from below has a young fern-plant attached to it; b the first leaf, w' and w'' the first and second root, h root-hairs of the prothallium. Magn. about 30 times.

After Sachs.

THE ROLE OF THE TREE-FERN IN THE FOREST.

In the rain forests of to-day ferns play a very striking part. We have seen that they are shade lovers for the most part and that many have become epiphytes, perching on the branches or trunks of forest trees, causing an accumulation there of humus in which they flourish. They adorn the forest trees with their slender, hanging or drooping leaves, giving to the rain-forest the softened outlines that are one of its most attractive features. They may, like the mange mange, become lianes. But they do not become parasites,

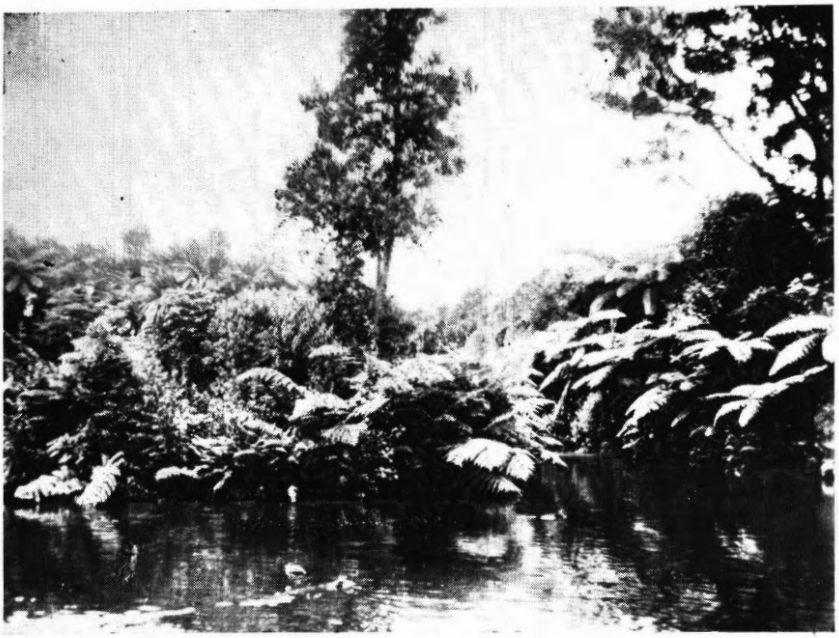
creatures living at the direct expense of their host plants by drawing upon their elaborated food products. Some flowering plants are prone to this degenerate habit. Especially do tree-ferns play an important part in rain-forest communities. We see their trunks covered in many cases with epiphytes. The thick covering of adventitious roots at the base of trunks, and the broken stipes of the upper part form a lodging place for epiphytes—some of them ferns such as the smaller filmy ferns, many of them seedling flowering plants. In such a fern as the mamaku, Cyathea medullaris, there comes a time when the trunk is bare of leaf-bases throughout most of its lengths. Then on this part, epiphytes have little chance to lodge, and the earlier dependent population has perished.

There is in the Wellington Botanical Gardens, an old trunk of mamaku on which long years ago, a seedling rata, Metrosideros robusta established itself. This plant is what we may call a "tap-root epiphyte." Starting on a tree it sends down a root that will ultimately reach the ground and become a trunk. On the way to the ground, it sends out lateral roots, clinging to the supporting tree which ultimately is killed.

The punga, C. dealbata, retaining its broken stipes for a very long time is a very favourite support for epiphytes. Among the most usual of its tap-root epiphytes are Nothopanax arboreum, the two species of broadleaf, and the kamahi.

Such epiphytes as those referred to will grow quite well upon the ground and all are commonly cultivated in nursery beds. They all are lovers of light and, starting upon another plant, they sooner thrust their leaves into the zone of light that suits them best and then soon enter into competition with the other inhabitants of the forest. They have not the drawback of a moral sense such as prevents many human beings from disregarding callously the interests of those on whose shoulders they have mounted to success.

In the Wellington Botanical Gardens, the wisdom of the Director has left standing on a broadened part of the pathway, a fine example of a punga on which a plant of Nothopanax arboreum had established itself a little below the crown. The fern is still alive and it is interesting to note how slow has been its growth compared with that of the epiphyte, whose branches tower above the supporting fern and whose roots have reached the ground. In the remains of the bush that these gardens still retain, constituting their chief interest for most visitors from overseas, one can find examples of all stages of this association of lancewood and tree-fern. Tree-ferns characterize, especially most rain-forests of the Southern hemisphere, but we do not expect to find them in sub-antarctic lands. Especially interesting, therefore, is the occurrence of Hemitelia Smithii on the East Coast of Auckland Islands.



Pukekura Park. Photo by Miss Ethelwyn Kirk.

THE TREE-FERN IN LANDSCAPE GARDENING.

No one in New Zealand can fail to notice the wonderful grace and beauty of tree-ferns, especially as one looks down upon them. Nowhere, in all probability, has there been a better example of ornate effect than was to be seen thirty years ago in the crater of the volcanic cone of Tautoro, near Kaikohe in North Auckland. There the greater part of the crater was filled with tree-ferns forming a sight of the most wonderful beauty. It was with regret that I learnt from a friend that only forlorn remains of this magnificent natural plantation now exist. There probably will come a time when most sheltered hollows, abandoned quarries and bare gullies in city reserves will have been filled with tree-ferns, giving an effect of surpassing beauty. It would be exceedingly far from fact if this suggestion were held to indicate that the use of the tree-fern has been neglected in New Zealand landscape gardening. It can not be used everywhere, but in many places it is being used with outstanding effect. There probably can be no finer instances than are to be seen in Pukekura Park, New Plymouth.

But here this lecture must close, not for lack of matter, but for lack of time and lack of a super-human quality in the endurance of my audience.

PEN-OTARA.

(By F. Sydenham, Assistant Horticulturist, Department of Agriculture, Wellington.)

At the head of the Otara River, as the name "Pen-Otara" implies, and about six miles from Opotiki in the Bay of Plenty, is to be found a small plateau which is furnished with a wealth of exotic trees. This was the home of the late Mr. and Mrs. T. M. Lewis. The trees remain as a lasting and faithful memorial to an ardent horticulturist and his wife.

It is fully 25 years since Mr. and Mrs. Lewis left Pen-Otara. During these years, through lack of careful attention, many of the trees, so carefully planted and tended, have suffered the fate of neglect. The planting, however, was extensive, and among those trees and shrubs that remain are some very fine specimens.

Leaving Great Britain in 1870, these pioneers spent several years in New Zealand before settling outside Opotiki. They chose as their home a place where trees to which they were accustomed were already growing. The place was probably a mission station, and one of the trees which remains from the earliest planting is a walnut. Sixty years ago this tree provided nuts by the sackful. It is still bearing heavily, and from its appearance it is likely to bear for many years to come. It is probable that it was planted not later than the fifties.

Within view of the walnut is a kauri, the top of which may be seen in Fig. 1. This specimen was a sapling beneath a larger tree that was felled and pit-sawn to provide material for the construction of the historic St. Stephen's Church at Opotiki. It is interesting to note that the kauri is rare in the Bay of Plenty.

Little is known of the early days of Pen-Otara. It is probable that the land to be used for farming had to be cleared of bush. A home had to be built. Early attention must have been paid to the planting of the grounds about the homestead.

To-day, what remains are the sturdier specimens and those that reached a size at which they were able to overcome the competition of volunteer plants and to out-reach the ravages of stock. A belt of Californian redwoods (Sequoia sempervirens) shelters the plateau from the south. Within this shelter are many choice trees and shrubs and a few which, as mature specimens, are rare to-day.

The giant bamboo, which is shown in Fig. 2, formerly produced canes large enough to make serviceable plant pots and useful railings for the farm. The growth is now smaller than formerly, but its size is still considerable, as can be seen from the photograph. The planting has developed very satisfactorily, and now clothes a large portion of the slope leading to the old homestead. The effect created by this bamboo is most pleasing.

Overlooking the orchard, which is situated in a valley, is a group of olives (Olea europaea). These are shown in Fig. 3, and

FIG. 1:

A distant view of Pen-Otara. In the left-hand corner is the top of the kauri. It is in the valley beyond this tree that the old orchard is to be found. The large light-coloured tree on the plateau is a tulip tree (Liriodendron tulipifera). To the left and partly obscured by this tree is the jacaranda (Jacaranda mimosaefolia).

FIG. 2:

The giant bamboo. The species has not been identified. It will be seen from the pungas (Cyathea medullaris) that Mr. Lewis did not plant only exotic trees. He made considerable use of natives.

are but a few of what were originally planted. A number of stumps nearby indicate where others grew. Those that remain are in perfect condition, and from the flowers they carry would appear to bear freely.

During a recent visit, a row of feijoas (Feijoa sellowiana) was found. This planting must have been made at least thirty years ago. The shrubs now stand 12 feet high, and at the end of December last were covered with bloom. According to the present occupants, they bear abundant and appreciated crops of fruit as large as duck eggs. Even to-day this useful and ornamental shrub is not grown by as many gardeners as it should be.

Without doubt, the finest tree at Pen-Otara is the jacaranda (Jacaranda mimosaefolia). This magnificent specimen stands 45 feet high, has a spread of 55 feet, and its trunk measured three feet from the ground has the circumference of nine feet. It is reliably stated to be 55 years old. It is a perfectly balanced specimen. This applies to almost all the trees, and shows the foresight of the planter in visualising, as he planted, the ultimate development that would be made.

The jacaranda blooms profusely during January and February and appears, as a bright blue object, on a lighter blue sky background. It is needless to write that it attracts many visitors, and it is gratifying to note that permission to view the tree at closer quarters is willingly given.

The heavy frosts experienced last winter injured most of the young growth. The recovery was slow, and at the end of December, when the photograph was taken, the tree had not regained its normal appearance. Still, it was making a brave display of flower buds. The tree as it was found at the end of December is shown in Fig. 4.

* * * * * *

It is with the object of placing on record the great interest that Mr. Lewis had in trees that this brief paper is written. The difficulties of sixty odd years ago did not lessen his ardour for tree planting. Those who have the opportunity of visiting this property cannot fail to be impressed by the enthusiasm that the planter must have possessed, and cannot fail to appreciate the foresight of the man in leaving us so rich a legacy.

Had our pioneers not planted as many did, New Zealand would be a vastly different country. It behoves those of us who have land to follow the example and to plant trees which, in addition to being a joy to ourselves will, in the years to come, be a joy to others.

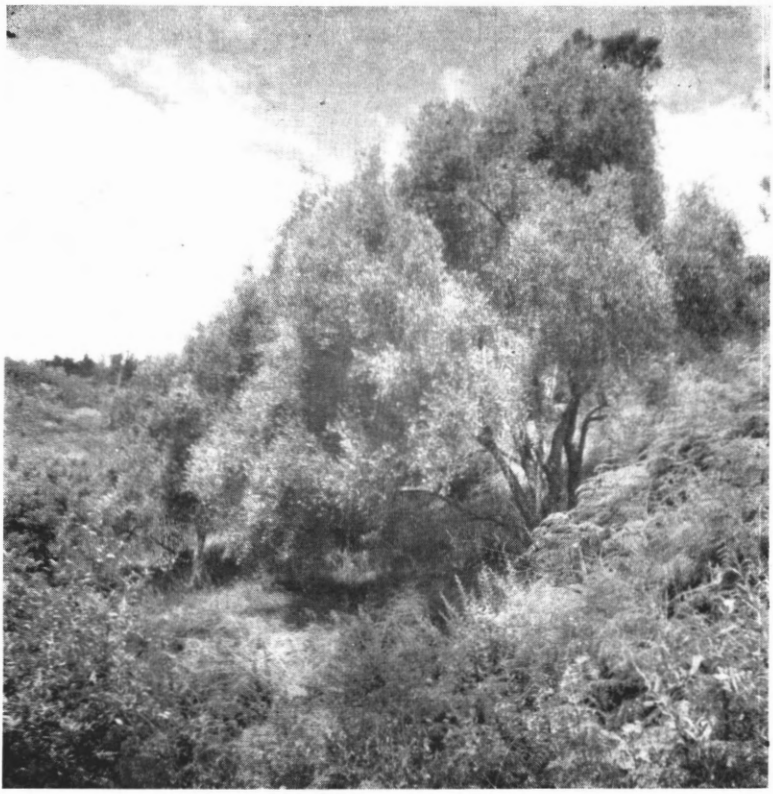


FIG. 3:
The olives (Olea europaea). There are three specimens in this illustration, the foremost one practically obscuring the others.

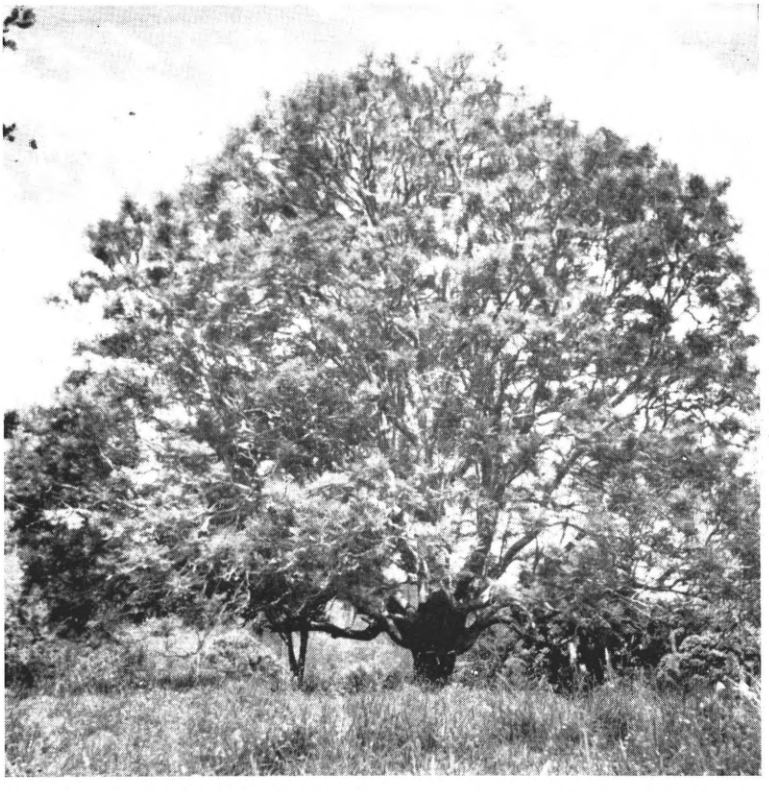


FIG. 4:

The jacaranda. The tree as it appeared four months after the severe frosts of the winter of 1939 which destroyed most of the young growth. One must see this specimen in bloom to appreciate its beauty.

HISTORIC TREES IN NEW ZEALAND.

(By H. H. Allan, Honorary Botanist.)

INTRODUCTORY.

The following remit, forwarded by the Canterbury District Council, was considered at the 1938 Annual Conference of the Institute:—"That the Government be approached with a view to preserving the trees planted by our pioneers on estates throughout the Dominion." Mr. J. A. McPherson, then local President, said that the Lands Department had asked for a list of historic trees. The remit was carried in the following form: "That the Government be approached with a view to preserving the trees planted by our pioneers, or other historic trees."

At the March, 1938, Executive meeting it was decided that, after consultation with the Honorary Botanist, the remit should be sent on to the Department of Internal Affairs, with information.

I agreed to endeavour to collect this information, but was not able to proceed with the matter at once. Later I issued a circular throughout the country asking for details of historic trees. I wish to express my appreciation of the very generous response from numerous interested persons, and feel that a special reference should be made to the enthusiastic co-operation of the Director of Horticulture and his staff. In November, 1939, I furnished a report to the Executive Council, followed by a supplementary report in December.

At a meeting of the Executive Council, Captain Sanderson, President of the Forest and Bird Protection Society, mentioned that his Society had passed a resolution: "That the two schemes being individually sponsored by the Minister of Internal Affairs and the Commissioner of Forests, should be amalgamated, and that all natural monuments, such as those of an Ethnological, Geological or Biological nature, should be included.

This was viewed with favour by the Executive Council, with the proviso that the Institute should retain the right of first publication of the matter arising from its original Conference remit. Pending publication no further action was taken.

The following list is therefore published as a preliminary contribution. It is not suggested that the list is anywhere near complete, or that all the trees mentioned are of equal importance. Some of them are already well guarded. It is hoped, however, that interest will be still further aroused, and that further information will be forwarded to the Institute as a result. It will then be possible to provide a reasoned statement for the consideration of the Government Departments concerned, with a view to effecting concerted action. The wider field of activities urged by the Forest and Bird

Protection Society is deserving of full support by the people of the Dominion, and the preservation of important historic trees will be one definite step forward. We may well learn from the Maori, and instil into ourselves something of his spirit of Tapu. An inspiring example of what shall be done is the careful preservation of a sacred puriri in the Hukutaia Domain at Opotiki. Visitors should not fail to respect this tree, and ponder the notice erected. It runs:

TAKETAKERAU.

He wahi tapu tenei no mua.
This is a "prohibited place" of olden time.

The bones of the distinguished dead, some years after burial, were—with much ritual, including on occasion the sacrifice of slaves—dug up (hahunga), scraped, painted with oxide of iron, and deposited in a cave or hollow tree where they would not be found and put to base purposes by tribal enemies.

A tree such as this was highly tapu, and any desecration of such tapu was a deadly matter and an affront to the tribal atua (ancestral gods). The offender's death would surely follow.

This particular tree (named Taketakerau) was used by the Upokorehe Hapu of the Whakatohea tribe for the deposit of their tribal bones.

AUCKLAND.

1.—Tane Mahutu, and other giant kauris in Waipoua State Forest.

2.—Large oak tree at Waimate North on property of Mr. R. Atkinson, planted by an early missionary.

3.—Large pohutukawa on sea-coast at Taranui Bay, on property of Mrs. Hewett. Said to have been used by the Maoris as a place to hang the heads of their human victims. One of the original Maori canoes is alleged to have landed near this treee.

4.—Oak tree at Waima on Hokianga Harbour, planted by missionaries about 1834, with a girth of 27 feet.

5.—Puriri on roadside at Kaingaroa, Mangonui County, with enormous spread of branches.

6.—Norfolk pine at Te Wahapu near Russell, on property of Dr. Hall. Believed to have been planted by Imperial Troops serving under Captain McDonald about 1829. Cut down in youth, it has produced five trunks of great height.

7.—Two pear trees at Port Keri Keri, on site of old Mission Station. Brought to New Zealand by Rev. Samuel Marsden in 1818 or earlier.

(a) On property of Misses Kemp, 50 feet tall, 39 feet spread, 7 feet girth,

(b) On property of Mr. Wallace. 50 feet tall. 46 feet spread, 13 feet girth.

8.—Tawa in Drummond's Bush, Whangarei, with name of Henry Mair, and date, carved on it.

9.—Pohutukawa at "The Nook," Whangarei Harbour, on property of Mr. Knopp, with girth of 34 feet.

10.—Camphor laurel at Kaitaia, planted by Rev. Joseph Matthews.

11.—Trees planted by Sir George Grey on Kawau Island.

12.—Pohutukawas in "Banqueting Hall," on Kawau Island; scene of cannibal feasts.

13.—Pohutukawas at Otamatea; scene of cannibal feasts.

14.—Kauri tree. Mr. Day's property, Whangarei Planted in 1868 by the late Mr. E. Boult.

15.—Pohutukawa, Whangarei, Mair Street. Planted by the late Mr. R. Mair, about 1880.

16.—Pohutukawa. Quay side, Whangarei. Planted by grandfather of Miss Reyburn 72/82 years ago.

17.—Camphor Laurel. Two trees in late Mr. Cafier's residence, Whangarei; about 80 years old.

18.—Redwoods. Maunu Road, Whangarei. Planted about 50 years ago; 122 trees on an acre of ground.

19.—Oak Trees. Kamo school grounds. Planted on the first Arbor Day celebrated in New Zealand, August, 1892.

20.—Totara Grove. Mr. T. Griffin's property, Totara Park. Self sown over 50 years ago.

21.—Pohutukawa, Peach Cove, Whangarei Heads. Perched on a boulder about 20ft. high.

22.—Kauri Tree. Harris Bros. property, Whangaruru. Named Hoori Wehi Wehi.

23.—Totara at Taumarunui. Planted by Maoris to commemorate agreement with the Government Surveyor, Rockfort. Rockfort persuaded the Maoris to allow the Main Trunk Railway survey to go on. On a footpath.

24.—Blue Gum, at Pukehou (old homestead of Donald Fraser).

25.—Kahikatea. Near railway station, Otorohanga. Said to mark some historic event in Maori history. Lopped some years ago but recovering well.

26.—Norfolk Island Pine. Mangawai, planted about 100 years ago.

27.—Oak. St. Leonard's Road, Mt. Eden, reputed to be largest in Auckland.

28.—Norfolk Island Pine. Mount Smart Road, Onehunga, on property of Mr. S. Brookfield; about 100ft. ligh. Planted between 1840-1850.

29.—Pohutukawa. Planted at the Residency, Waitangi, by Mrs. Busby.

30.—Hawthorn Hedge. Planted around the Priests' Home, Russell, in 1839.

31.—Rose Bushes. Planted along drive at Government House, Russell Town, by Captain Hobson.

32.—Orange Tree. Kerikeri, on property of Misses Kemp. Said to be oldest in New Zealand.

33.—Elm. On roadside, some two miles from Rangiahua Hotel, Hokianga County. Said to have been planted by Baron de Thierry.

34.—Puriri. Large tree in Mrs. Bindon's paddock at Okaihau. Said to be called "Okaihau" by Maoris.

35.—Norfolk Island Pines. Haruru (Waitangi falls). Said to have been planted by Archdeacon H. Williams.

36.—Norfolk Island Pines. "Puketona," home of Edward Wilson; "Pakaraka," home of John and Henry Williams.

BAY OF PLENTY.

37.—Puriri tree on reserve of Hukutaia Domain Board. A huge tree of great age formerly used as a burial tree of the Upokorehe Hapu of the Whakatohea tribe. Human bones are still in situ at the base of the tree.

38.—"The Aspen Tree," Willow Street, Tauranga, in a small reserve. Planted prior to 1864; now a large tree preserved as a local land mark. There are several stories of its origin, e.g. that it was originally a stake to which a horse was tied, that it was a fence post. All agree as to the approximate date of planting. Protected by Act of Parliament.

39.—"The Archdeacon's Sentinels." Two Norfolk Island pines planted by Archdeacon Brown at the main gateway of the old mission grounds, now known as "The Elms." The trees are thought to be nearly 100 years old. The mission house and grounds have been preserved as nearly as possible in their original state. There are three old elms, an oak, and several other old trees in the original mission grounds.

40.—Pohutukawa tree on Mayor Island, a very large tree associated with the Maori history of the island.

41.—"The Wishing Tree," on Hongi's Track, near Rotorua.

42.—Californian Sequoia, nearly 100 feet high, planted in 1887, near the Police Court, Rotorua.

43.—Cabbage tree grove near Te Teko, used as larder for cannibal feasts.

44.—Pohutukawa. Very large specimen on Mayor Island, spread of branches 115ft.

45.—Poplar at Tauranga, planted about 1830.

POVERTY BAY.

46.—Pohutukawa tree in grounds of Native School at Te Araroa, named Te Whao Perekohu, after a Maori chief. The Maoris extended the school grounds to include this tree.

47.—Karaka tree at Otoko, remote from any other of this species.

HAWKES BAY.

48.—Kauri tree at Hastings, planted by Maoris.

49.—Titoki tree at Hastings, used by the Maoris in the rites of disposal of the afterbirth.

50.—A large cabbage tree at Hastings.

TARANAKI.

51.—Spanish or Sweet Chestnut in garden of late Mr. Newton King, of Brooklands, New Plymouth. This and other splendid trees in Brooklands were planted by the late Captain King in 1855. Height 57 feet, spread 35 yards, girth 5 feet.

52.—Puriri, a large specimen in the native bush in Pukekura Park, New Plymouth. Diameter of trunk 5 feet, height 65 feet, with massive limbs.

53.—Oak. Beautiful specimen in St. Mary's Churchyard, New Plymouth.

WANGANUI.

54.—Karaka on Anzac Parade, Wanganui, used as a moorage by the Maoris, now six chains from river.

55.—Nothofagus menziesii, on river bank near Raorikia, of great age, considered to have been planted by the Maoris.

56.—Group of trees at Putiki Mission, including the Mangaeo, the Australian Syncarpia laurifolia, an old pear tree (probably "Vicar of Wakefield") and a fine old oak. The latter was grown from one of the four acorns sent out to the Rev. Taylor at the time of the death of the Prince Consort. These acorns were taken from oaks in Windsor Forest.

57.—Walnut at Upper Aramoho on Mr. Earle's property, a magnificent specimen.

58.—Macrocarpa in front of Jubilee Home, Upper Aramoho; girth 25 feet.

59.—Flowering Ash on private land, Bell Street, Wanganui. Said to have been planted by an officer of one of the regiments quartered there when the Redoubt was on Rutland Hill.

60.—Gum tree of great age on Mr. D. McGregor's property, Fordell.

61.—Araucaria bidwillii. Two wonderful specimens on Mr. Patterson's property at Okoia.

62.—Bay tree, two varieties on Mr. Patterson's property at Okoia. This and the Araucarias are some of the earliest trees planted in the Wanganui district.

63.—Karaka, fine old specimen at corner of Liverpool and Campbell Streets, Wanganui.

64.—Schinus molle a very large specimen in Harrison Street, Wanganui. Probably planted many years ago by the late Purua McGregor, a Maori lady of high caste, who was a great lover of trees.

65.—Pukatea, a fine old tree on Mrs. Hatrick's property, St. John's Hill, Wanganui.

66.—Aspen nearly 80 years old, with a diameter of nine feet, at "Fornby," the home of the Strachan family at Okoia.

67.—Redwood, two giant trees on Mr. Douglas Simpson's property at Hunterville.

WELLINGTON.

68.—Karaka grove at Parewanui, site of the sale of the Rangitikei lands.

69.—White pine and totara trees on Major Wilson's property at "Burleigh," Bulls, estimated to be up to 800 years old.

70.—Kohi Kohi on Miss Nancy Wilson's property at Lowry Bay.

71.—Titoki on Miss Nancy Wilson's property at Lowry Bay. Planted on behalf of Chief Scout, afterwards named by him in 1931.

72.—Kauri in old Mission ground, next the Maori cemetery at Otaki, planted nearly 100 years ago.

73.—Kauri planted at Waikanae about 70 years ago, by the then Chief of the district, Wi Parata Kakakura. This is on private land on the Beach Road.

74.—Norfolk Island Pine near the new main road, Paekakariki, on what was the property of Mr. J. S. Smith.

75.—Rhododendron in gardens of the Ministerial residence, Molesworth Street, Wellington given to the late R. J. Seddon by the Duke of Argyle in 1902, the year of the Coronation of King Edward.

76.—Blue Gum on Rangitikei River Flat, opposite Ohakea Aerodrome. Planted by Karrana Huria.

77.—Kowhai. A very large specimen up the Kawhatau River on property of Bailley Bros.

NELSON.

78.—Two oak trees in Nelson, planted by the late Henry Seymour in 1842. One grows on the road in Seymour Avenue, near the house of Mr. Cockburn, the other on private property near the bridge at the S.E. side of the avenue. Mr. Seymour had been Secretary of the Cheltenham Horticul-

tural Society, and brought out acorns to Nelson with him. "A high flood shortly afterwards washed one of the seedlings away, but a diligent search led to its recovery over a mile away on the banks of the Maitai River, of which the brook is a tributary. The seedling was brought back in triumph and this time was planted in the field at a safe distance from the Brook." (Letter from Mr. F. G. Gibbs.)

79.—Gum tree on the Strafford Estate, Ruby Bay, Mapua. Planted by the first settler, Mr. Buxton.

80.—Gum tree at Tasman, Nelson, planted by Mr. G. W. Rout, about 80 years ago. Property now occupied by Mr. F. E. Nottage.

81.—Trees at Appleby where Sir Donald McLean and the Archbishop Redwood family settled in the early days.

82.—Walnut tree on property of Mr. P. Bates, Riwaka. Planted by the late John Fowler in the early forties. Height 90ft., spread 100ft., trunk 30ft.; massive lower limbs rest on the ground.

83.—Pear tree on property of Mr. P. Williams, Shaggery Road, Pangatotara. Planted by the Deck family and known to be over 75 years old. Height 65ft., spread 62ft., circumference 10ft.

MARLBOROUGH.

84.—Gum trees at Wairau Bar, said to have been planted by Mr. James about 1843.

85.—Gum trees at Langley Dale, planted to commemorate the separation of Marlborough and Nelson Provinces in 1859.

86.—Eucalyptus viminalis, a fine specimen at Woodbourne, the old Fairhall Homestead, planted by Henry Godfrey about 1857.

87.—"Sinclair's Gums," Nelson Street Bridge, Blenheim, from seed from the Wairau Bar, about 1854.

88.—Gums at Tua Marina on the Picton Road, from seed from the Wairau Bar.

89.—Taylor Pass gums, planted by Eyles and Empson between 1857 and 1860.

90.—Blairach gums, a mixed plantation by McRae's in the early fifties.

91.—Sequoia sempervirens, at Catholic Church, Blenheim; planted by Mr. William Skilton in the sixties.

92.—Deodar Cedars at the Hawkesbury Homestead.

93.—Titoki tree near Massacre Hill, Tua Marina, marking the place where the first white party crossed in a canoe about 1843/45. The tree was growing there at the time.

94.—Totara tree at Pelorous Bridge, reputed to be 500 years old, near the site of the old Maori Pah, Titi Roukawa.

CANTERBURY.

95.—Blackwood, a large specimen in the grounds of the Girls' High School, Christchurch.

96.—Kahikateas in Riccarton Bush.

97.—Ginkgo biloba at Canterbury University College, planted some forty years ago.

98.—Copper beech in Canterbury University College grounds, dating from the time of Lord Rutherford.

99.—Ash in Ashbury Park, planted by Captain Woolcome, the first magistrate of the Timaru district, in 1861. Said to be the first deciduous tree planted in Timaru.

100.—Totara trees; magnificent specimens at Peel Forest.

101.—Cedar of Lebanon. Reputed to be the finest in Canterbury, over 100ft. high. Geraldine Park.

102.—Weeping macrocarpa. An unusual form, Geraldine Park.

103.—Pinus insignis. Mr. Gray's farm, Pleasant Valley Road. Planted in 1860, 100ft. high.

104.—Totara. On property of Mr. E. H. Logan. Planted at house of late Mr. Hewling, surveyor of land and township of Geraldine. House built in 1861. Tree not doing well, now in coal yard.

105.—Oak planted about 20 years ago in the school grounds at Lincoln village in memory of Mr. Cookson, a schoolmaster who planted in the grounds a native shrubbery.

106.—Oak. Fairlie Athletic grounds. To commemorate 50th year of reign of Queen Victoria.

107.—Oak. Near War Memorial, Fairlie. To commemorate 60th year of reign of Queen Victoria.

108.—Gum. Fairlie; said to mark the boundary of the original Albury Estate.

109.—Blue gum. Willowbank, Temuka. First blue gum planted in South Canterbury. Planted from seed sown in 1859.

110.—Douglas fir. Brought to New Zealand in Wardian case in sailing ship 1859. Planted at homestead, Peel Forest. Thought to be oldest in New Zealand.

111.—Wellingtonia. Planted by Bishop Harper, October 29th, 1864, at homestead, Peel Forest.

112.—Cedrus deodara. Imported into New Zealand in 1859. Seedlings were raised by Mr. W. W. Smith in 1878, one of which is at homestead, Peel Forest.

113.—Araucaria. Planted in 1859 at homestead, Peel Forest. Is still a fairly good specimen.

114.—Pinus insignis. Planted between 1860-1865 at Peel Forest homestead. One of the oldest in Canterbury.

OTAGO, SOUTHLAND, FIORD DISTRICT.

115.—Oaks at main gate Queentown Domain. Planted about 1870, one by the late Mrs. Isabel Falck, wife of the then postmaster at Queenstown.

116.—Gum trees at "Eltham," "Waianiwa." Two beautiful trees planted from seed brought from Sydney in 1856 by Mr. James Wilson, one of the very early pioneers.

117.—Tree stumps at Dusky Sound stated to be remains of trees cut down by Captain Cook.

118.—Gum trees of very early date on shores of Lake Te Anau.

119.—Pinus insignis. Ten trees planted by the late Mr. W. T. C. Sonntag at Brockville, Kaikorai, Dunedin, in 1863.

120.—Apricot. The original Roxburgh Red Apricot tree at Roxburgh, planted by the late Mr. J. Tamblyn of Coal Creek in 1862 or 1863. There are now 11,530 trees of this variety in the district.

121.—Hector's tree, Greenstone Valley, Lake Wakatipu, on which Dr. Hector carved his initials 75 years ago, when he made the first white man trip from Martin's Bay to Wakatipu.

122.—Oak trees planted in Queenstown Domain in 1869, by Miss Grace Jenkins, Mrs. John McBride and Mrs. Falck.

REVIEWS.

THE GLADIOLUS ANNUAL, 1940.

The Gladiolus Annual, 1940, issued by the British Gladiolus Society, has been edited by its Secretary-Treasurer, A. E. Blake Amos, Colchester, England, since its foundation. His wife's services are also appreciated by the Society.

Mrs. C. Jessie Collingridge, President for seven years, acknowledges, on her retirement, an address of gratitude and goodwill.

Notwithstanding the threat of war, the Society's 1939 Exhibition at Harrogate was a great success as also was the eighth Exhibition at Liege of the Belgian Gladiolus Society.

A report on tests at the Trial Garden at Halstead, Essex, is interesting, especially the statement: "It has long been contended by the best growers in America, and by a few in England, that to achieve the best results with Gladioli it is best to include them as a crop in the general scheme of rotation in vegetable growing, etc." In connection with this a New Zealand grower comments: "Recently on a visit to another grower, who had a wonderful stock of vigorous Gladioli, I was interested to note that there was not one yellow blade to be seen. When asked if he used fertilizers he replied, 'Gladioli may respond to organic fertilizers, but not to those of a chemical nature.' The excellence of his results was due to seaweed. Where seawed is used, the foliage takes on that deep green, to which we all aspire but seldom attain by other methods. I wonder if I am right in suggesting that high content of phosphorous is the secret."

Unfortunately the war precludes any immediate further activities in the Test Garden.

"Gladiolus in Hungary," by Nicholas Redlich, deals with cultivation in extreme heat and cold, and it is interesting to note that Picardy, so favourably known here, is the leading foreign variety.

"Gladioli in Eire," by P.B.S., shows originality, humour and keen criticism of varieties, including "Miss New Zealand" which was disappointing to this grower although a champion here. Experiences with diseases and pests and efforts to combat these are treated entertainingly.

Dry Rot and Hard Rot and their control are dealt with under the heading of "Gladiolus Diseases" by Robert H. Jeffers, N.D.H., F.L.S., in a most useful article for which growers should be grateful.

"Canada Calling," by Frank E. Milne, President of the Canadian Gladiolus Society, is imperialistic in tone due to the recent Royal Tour and declaration of war at the time of writing. The temperature was then 93, but this is offset by a very cold winter and a rather short spring and autumn. This Society publishes an Annual of about 144 pages and a Semi-Annual of about 40 pages, which is claimed to be the oldest publication devoted exclusively to the Gladiolus.

"More Tips for Beginners" is an informative article especially on the exhibition side.

Carl Salbach, Junior, writes interestingly on new and recent introductions as also does K. W. J. Lowes on "Exhibition Gladioli" in Northumberland. He mentions two spikes of J. S. Bach "with thirteen and twelve enormous blooms open," and "a magnificent spike of Mrs. S. A. Errey with eleven huge blooms in tip-top condition."

Errey Brothers, of Australia, contribute "Random Notes on Gladioli," covering seasonal experiences and current problems.

"Cutworm," by E. R. Lynas, deals with the life history and method of control of this pest. The only cure was found to be napthalene.

In "Gladiolus Growing in South Canterbury, New Zealand," Mr. W. G. Paul states his method of cultivation and experiences with varieties.

"An Amateur in Lancashire" mentions "Miss New Zealand" with bottom florets seven inches across and another New Zealander "Maunga," raised by Mr. J. Burns, now in Australia, as the best white in his garden this year. He also states: "I have never seen anything yet to equal 'Rewi Fallu,' raised in Adelaide."

In "Notes from Calgary, Canada," A. Cyril Brethour mentions the foregoing varieties and also the New Zealanders, "Rawhiti, Takina, Marama and Hinemoa."

The paper, printing and illustrations are excellent and the colour plates are magnificent. Altogether it is a most creditable production. G.S.N.

FEILDEN, G. St. Clair, and GARNER, R. J., Vegetative propagation of tropical and sub-tropical plantation crops.

Technical Communication 13 of the Imperial Bureau of Horticulture and Plantation Crops, East Malling, Kent, England, 1940, pp. 99, bibl. 284, 3/6.

When in 1936 the Imperial Bureau of Fruit Production issued a technical communication dealing with the vegetative propagation of some 100 fruit varieties grown in the tropics and sub-tropics, it was not without misgivings as to the number of persons likely to be interested.

That such fears were unwarranted was quickly shown by the demand on issue. This was immediate and so considerable as to necessitate the reproduction of the publication in the following year.

The present work by the renamed Bureau, which deals, appropriately enough, with the vegetative propagation of some 55 plantation crops, should form a useful companion volume.

The help of technical experts has been invoked for adequate treatment of such major crops as rubber, coffee, cocoa, etc., while the foreign literature has been thoroughly combed for details of propagation of the less familiar, but nevertheless, important crops.

One feature of the previous work which commended it also to workers in temperate regions is retained and considerably enlarged. That is the section devoted to methods used in vegetative propagation. The descriptions there are supported by simple, clear, line drawings of some 17 types of graft and 7 types of budding commonly used in vegetative propagation.

In addition, tropical workers will be glad of the account and illustrated detail of the construction of loosely woven potting baskets which have been found so useful a substitute for pots in nursery work in the tropics.

For those who wish to study originals a list of references immediately follows the discussion on the propagation of each particular crop.

INSTITUTE NOTES.

PERSONAL:—Mr. F. S. Pope (President) has been granted three months' leave from 1st May, on account of his absence from Wellington.

As we go to press, advice comes to hand that Mr. B. P. Mansfield, Superintendent of the Invercargill City Reserves for seven years and, for the same period, Hon. Secretary of our Southland District Council, has gone into Camp at Trentham with the Second New Zealand Expeditionary Force. Mr. Mansfield enlisted for overseas service on the outbreak of war but his services were retained by his City Council, pending the successful conclusion of his scheme for growing produce on the City Reserves. He does not intend to relinquish his position as Hon. Secretary, nor as a member of the Executive Council and of the Examining Board. Mr. K. I. Robertson, Agricultural Instructor, Southland Education Board, P.O. Box 44, Invercargill, will act as Hon. Secretary during Mr. Mansfield's absence on active service.

Mr. H. Bennett, Dunedin, recently elected Hon. Fellow, and his son, Mr. H. O. Bennett, called at the Institute's office in April. A prior engagement prevented them from attending the Executive's monthly meeting.

Best wishes for continued good health and happiness have been extended to Mr. D. Tannock, Superintendent of Parks and Reserves, Dunedin, who retired on the 31st March.

VISITS:—The Dominion Secretary represented the Institute at the Dominion Council of Commercial Gardeners, held at Wellington from the 12th to the 14th June. Mr. W. K. Dallas, Director of the Horticulture Division, and the Dominion Secretary, were present on the 10th June at the Annual Meeting of the Wellington Horticultural Society, of which Mrs. Knox Gilmer is President. At this meeting Mrs. H. T. Lovell, Hawera, gave an interesting address on "Growing Blooms for Market the Whole Year Through."

EDUCATIONAL:—Mr. J. A. McPherson, Director of the Botanic Gardens, Christchurch, has forwarded a schedule of lectures for trainees of the Christchurch Domains Board and Christchurch City Reserves and the Executive Council's appreciation has been conveyed.

It was mentioned in the Director's Annual Report for the year ended 31st March last that Mr. F. J. Jollie N.D.H. (N.Z.), formerly of New Plymouth and Kew Gardens, has joined his staff as propagator; that Mr. E. J. Barnett secured an appointment with the Lower Hutt Borough Council for further experience prior to going abroad; that Mr. L. J. Mitchell was unfortunately prevented by the war from taking up an appointment at Kew, and that past trainee, J.

A. Mashlan, now on active service, has been short-listed for an appointment there. Of past trainees, it is mentioned that Mr. D. C. MacKenzie, N.D.H. (N.Z.), left Kew to join the New Zealand Anti-Tank Unit in London, and that R. W. Balch, N.D.H. (N.Z.), left Kew later for further experience, and will probably return to New Zealand.

DISTRICT COUNCILS:—Otago: Advice has been received from Mr. D. Tannock, Hon. Secretary, of the revival of the Otago District Council, with Dr. J. E. Holloway as President, and gratification has been conveyed. Southland: A circular is being issued to gardening radio broadcast inquirers. Taranaki resumed this season's monthly meetings on 21st May, 1940, with an address by Mr. J. C. McDowall, Past President, on "Science Lends a Hand in the Garden." At the monthly meeting on the 24th June, Mr. D. H. Offin will deal with "Diseases of Garden Plants." There will also be a presentation at this meeting of the miniature won by Duncan and Davies, Ltd., and Ivon E. Watkins in respect of the Thomas Waugh Testimonial Cup and the G. A. Green Memorial Cup respectively. Both cups and miniatures were donated by the New Zealand Horticultural Trades Association and the latter are handed over upon the return of the cups which were won at the National Flower Show, 1939, New Plymouth.

VEGETABLE GARDEN COMPETITION:—The Egmont A. and P. Association is holding a Vegetable Garden Competition over the whole of its area, which has been divided into five districts. Cups and prizes have been donated and a record entry is anticipated. Judging by officers of the Horticulture Division will be carried out in November.

EXAMINATIONS

Examinations for the following are conducted by the Institute:—

1. **Junior Certificate in Horticulture.**
2. **Intermediate Certificate in Horticulture.**
3. **Diploma in Horticulture.**
4. **Seedsman's National Certificate.**
5. **National Certificate in Florists' Art.**

Examination Papers

Sets of examination papers used at the last six examinations in horticulture are obtainable on application for sixpence per examination set.

Address all correspondence to:

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