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CONTENTS.

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IN view of the absolutely unavoidable increase of all expenditure of every sort and kind, which affects the Society quite as much if not even more than it does any private individual—increase in cost of goods of all sorts and also in labour;

In view, also, of the equally impossible increase in the amount of existing Fellows' subscriptions;

And in view, in the third place, of the daily increasing demands being made on the Society for advice and assistance;

It has become imperatively necessary for the Secretary to call upon all good Fellows of the R.H. Society to help him by obtaining the consent of all their friends and acquaintances to allow them to send their names and addresses to the Secretary, intimating that they desire to join the Society at once. Will you not do this for the sake of the old Society?

W. WILKS,

Secretary,

Vincent Square, S.W.1.

THE RT. HON. LORD LAMBOURNE,
President of the R.H. Society.

[To face p. 1.

JOURNAL

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ROYAL HORTICULTURAL SOCIETY.

VOL. XLIV. 1919.

SOIL MAKING.

By Dr. E. J. RUSSELL, M.A., F.R.S., C.B.E.

[Read July 2, 1918; Mr. E. A. BOWLES, M.A., V.M.H., in the Chair.]

ONE of the earlier lecturers on soil, EVELYN the famous diarist, introduced his subject by a quotation from a philosopher who argued that there were " one hundred and seventy-nine millions, one thousand and sixty, different sorts of earths." Present-day audiences do not favour such minute subdivisions, and I shall therefore adopt a much broader basis of classification. For our purpose it is sufficient to divide the constituents of the soil into two great classes—mineral matter derived from the rocks, and organic matter derived from plants. Generally there is a great disproportion in amount between these: in an ordinary field soil the mineral matter forms about 95 per cent. of the whole and the organic matter only 5 per cent., or sometimes less. In a garden soil there may be up to 10 per cent. of organic matter and 90 per cent. of mineral matter. Only in fen and peat soils does the organic matter rise much higher in amount, and there it may constitute 60 or even 70 per cent. of the whole. Translating these figures into tons to the acre we find that to a depth of 9 inches the mineral matter constitutes about 950 tons and the organic matter about 50 tons of the dry matter.

The processes by which the mineral matter has been formed belong to the study of geology; we are concerned only with the broad results of the changes. The solid rocks have been ground down to particles varying in fineness from an impalpable powder upwards to gravel and stones. There is considerable difference in chemical composition between the finest and the coarsest material: in the south and south-east of England the coarsest particles are mainly silica, which is very insoluble in water and therefore not easily reducible in size by the washing of rain, while the finest contains much more iron, alumina, &c. In the north, however, the coarse particles contain other constituents also, and are indeed more like the original rock; this is shown in the following table:

COMPOSITION OF SOIL PARTICLES.

—	Silica (SiO_2).		Alumina (Al_2O_3).		Iron Oxide (Fe_2O_3).	
	S.E. of England.	Aberdeen.	S.E. of England.	Aberdeen.	S.E. of England.	Aberdeen.
Fine gravel . .	94·4	85·0	3·0	8·6	2·1	1·1
Coarse sand . .	93·9	83·9	1·6	9·3	1·2	1·1
Fine sand . .	94·0	73·9	2·0	13·5	1·2	4·2
Silt . . .	89·4	70·1	5·1	14·0	1·5	5·8
Fine silt . .	84·1 64·3	67·2	7·2 19·3	18·9	2·6 7·6	7·8
Clay . . .	53·2 49·0	44·1	21·2 29·8	27·6	13·2 13·1	21·8

Presumably the difference arises from the circumstance that the soils in the north are mainly formed direct from the rock, *e.g.* from granite in Aberdeen; while in the south they have undergone two or three long immersions in sea water—in the Jurassic sea and in the sea of Cretaceous times—besides other wanderings calculated to allow of the removal of everything that could be dissolved out. This difference in composition may be expected to affect the properties of the soil, and so we should expect to find the northern soils differing from the southern. Agricultural observations are accumulating: it would be interesting if horticulturists could accumulate observations also.

Perhaps the most striking property of these mineral particles is their astonishing permanence. It used to be thought that weathering went on sufficiently quickly to produce appreciable quantities of food for plants. Eighty years ago soil chemists looked upon the subsoil as a storehouse of plant food; they advised bringing up some of the subsoil to the surface in autumn, so that weathering could go on during winter and provide a stock of plant food for the spring. Practical agriculturists devised appropriate methods. In the fifties and sixties of the last century a great discussion was started by the Rev. S. SMITH of Lois Weedon * as to the feasibility of growing wheat in this manner; manual labour was cheaper than manure, and therefore trenching—real trenching, not bastard trenching—was recommended as a suitable substitute. But many years of experiments have shown that cultural processes based on weathering are of

* *A Word in Season.* Rev. S. Smith, 1849: amplified in 1886 to *Lois Weedon Husbandry.*

no agricultural value: weathering generally takes ages rather than years and is of little interest to the agriculturist or horticulturist. The soil particles change, but very, very slowly. There are still enormous differences between the grey soils formed in the Lias period and the red soils formed in Triassic times: very much greater than the differences between the particles of the top 9 inches of a natural soil exposed for thousands of years to the weather, and those of the lower depths which have lain protected from the weather: indeed, one of the most striking features of modern soil work is the small difference in mineral matter between surface and subsoil. As the particles were left when they were deposited from sea or wind currents, so in the main they have remained, and seem likely to remain for any period of time that interests us. In the south the process of soil formation consists mainly in the washing away of the cement that has held the rock particles together: the particles then tumble out from the position in which they were consolidated millions of years ago. Adjoining formations still show differences not much less than might have been seen in those days. In the north and west there are great areas derived from igneous or very old rocks which are not agglomerated in this way: soil formation here has proceeded by the chipping off of fragments. This process depends very much on climatic factors; hence there is some tendency to uniformity of soil type in a given district, even when different kinds of rock occur. This is shown below:

Soil Types in N. Wales and S.E. England.

—	S.E. England. Soil types widely different.		N. Wales. Soil types tend to uniformity.		
	London Clay	Thanet Beds.	Pre-Cambrian, Cambrian, Ordovician, Silurian.		
	—	—	Anglesey.	Paleozoic.	Sand.
Fine gravel	0·4	0·5	8·3	10·6	5·1
Coarse sand	0·8	16·9	18·0	8·0	50·0
Fine sand	6·5	57·3	21·2	14·1	15·6
Silt	15·8	8·2	13·6	14·1	9·6
Fine silt	16·3	3·9	18·7	28·8	9·1
Clay	40·5	6·0	5·0	6·6	2·4

The horticulturist and agriculturist are both more interested in the size of the particles than in their composition, because it is size of particles that determines whether a soil is a sand, a clay, or a loam. Typical examples have the following composition:

—	Sandy Soil.	Loam.	Clay Soil.
Coarse and fine sand	65	30	10
Coarse and fine silt	20	45	50
Clay	5	15	30

The difference in properties and values between these three are so familiar to horticulturists that I need not recapitulate them. They arose in past geological ages: the processes involved are no doubt still operative, but they work so slowly that they produce no appreciable effect in our time.

The second great class of soil constituents, the organic matter, comes in as the result of vegetation. Although not great in amount, it introduces a fundamentally new property: it contains energy stored up from sunlight by the growing plant, is easily oxidizable, and in oxidizing it liberates this energy. Now life is impossible without sources of energy; the organic matter thus enables life to exist in the soil. Soil contains a great population varying enormously in properties, but all in the last instance dependent on the vegetable residues. It is this that constitutes the great difference between surface and subsoil.

Organic matter is not strictly essential to plant growth. Plants can be grown in pure sand or even in water, provided the necessary food materials are added. But the process is so tedious that it would be all but impossible on the large scale. Work is lightened enormously by the presence of the organic matter and the accompanying soil population. Three great effects are produced. One of the least obtrusive but most important is the removal of the dead remains of vegetation. The great importance of this function is seen on some of the Rothamsted grass plots, where sulphate of ammonia is applied in large quantities without any lime, so that the soil has become acid and many of the soil organisms are killed. When in late autumn the withered leaves and stems fall back on the soil they simply lie there partially decomposed. After a time they form a dense mat which covers the soil to a depth of two or three inches: this soon becomes so compact and thick that plants cannot force a way through. Only a very few kinds of seeds can germinate on this mat, and before long the plot contains many bare patches and a very limited flora. Clovers and the Leguminosae are completely killed, so also are the weeds: the last survivors are a few grasses, viz. False Oat Grass, Meadow Foxtail, and Yorkshire Fog.

Wherever the land lies high, or for any reason is left undisturbed, there is always the possibility that a layer of undecomposed vegetable matter may form. On the road between Stafford and Uttoxeter there is a tract of land now covered with 9 inches of peat. The old surface is a red marl so heavily mixed with glacial gravel and pebbles that it could never be cultivated, and therefore was not drained. In consequence organic matter ceased to decompose quickly: a layer of peat was formed which is now nine inches thick, and now the vegetation is mainly sheep's fescue, Nardus, Molinia, and Bilberry. In Yorkshire on the mountain limestone there are similar deposits which form long ribbon-like strips when ploughed, and are difficult to bring under the ground.

This is the result of having insufficient soil population to demolish the herbage as it falls back. In garden practice another effect would be even more harmful. Undecayed vegetable matter opens up the soil much and facilitates evaporation so as to render difficult the maintenance of proper moisture conditions. If there were no soil population to act as scavengers it would be necessary to gather up the leaves not only from paths and lawns, but from the flower beds and vegetable ground as well.

A further great effect of the soil population is to keep in circulation the plant nutrients, and especially the nitrogen compounds. It so happens that nitrates, which are by far the most important nitrogenous foods, are easily washed out from the soil, so that there is never any very large reserve there. The stock is quickly taken up by plants and immobilized by conversion into protein. Once the plant residues get into a normal soil they begin decomposing: the process is now reversed and the proteins are converted into nitrates. The dead remains of one generation of plants thus provide food materials for the next generation.

But they do more. Some of the soil bacteria have the remarkable property of fixing gaseous nitrogen from the air and changing it into protein: other bacteria can then attack the protein and convert it into nitrates. The nitrogen fixation requires a source of energy, and this is provided by the organic matter of the plant residues. Thus the decomposition brought about by the soil organisms not only makes available the nitrate stored in the old dead vegetation, but it helps to increase the supplies by bringing in newly fixed nitrogen.

Unfortunately Nature is full of reverse processes: the vegetable remains not only bring about the fixation of nitrogen, but also the loss of nitrogen. This reversal is quite orderly, and the conditions are definite; they have recently been discovered in the laboratory. The useful process—the fixation of nitrogen—occurs after certain decompositions of the plant residues have taken place; the wasteful process—loss of nitrogen—occurs before or during these decompositions. Thus, when fresh vegetable products, such as straw, starch, or sugar, are added to soil in spring immediately before sowing, there is a depression in growth due to loss of nitrogen; when the addition is made in autumn some months before sowing there is no depression but a gain in crop. Thus we can justify the autumn application of farm-yard manure, especially when unrotted, rather than the spring application.

The fixation of nitrogen is intensified when a leguminous crop is grown. If one pulls up a root of clover, peas, or beans, one finds little nodules present, which, when examined under the microscope, are seen to contain numerous bacteria. These organisms are busily engaged in seizing nitrogen from the atmosphere and building it up with compounds of use both to themselves and to the plants. The necessary energy comes not from decaying plant residues, but from the juices of the living plant: the organism is a parasite living on its host, but it is one of the few that gives more than it takes.

The third effect of the decomposing organic matter is to modify the physical properties of the soil. It possesses the glue-like properties to which the name colloid is given: nowadays chemists and physicists attach great importance to colloids, and are pointing out their significance in the soil. Perhaps the most striking property of the decomposing organic matter is its power of securing a tilth and of increasing the water-holding capacity of the soil. Thus, a soil rich in organic matter can be more easily cultivated; it keeps moist longer, and it is liable to less drainage than soils poor in organic matter. All these properties are well exhibited on the Rothamsted plots. On the mangold field the plot annually receiving farm-yard manure gives a better tilth, and therefore a better seed bed, than those that never receive it. In a dry season this makes an enormous difference to the young plant during June and July, though usually things right themselves before the end of the season. On the Broadbalk field the plots are all under-drained, so that we are able to observe the effect on drainage. On the plots receiving no farm-yard manure the drains run fairly frequently: on the plot annually receiving it the drain runs very rarely.

NUMBER OF DAYS WHEN DRAINS RAN.

—	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	Average of 12 Years
Dunged plot	2	3	None	1	None	None	1	None	None	None	None	2	0·7
Unmanured plot . .	27	20	11	14	10	9	10	20	20	32	9	20	17

The effect of organic matter in building up a soil is strikingly shown on one of the barley plots. This received farm-yard manure annually for twenty years from 1852 to 1871, but nothing since. Alongside is a plot that has received nothing during the whole period. The effect of the farm-yard manure went on increasing during the first thirteen years; it then increased no more, but kept at its high level. In 1872 the farm-yard manure was discontinued. The yield has gradually fallen, but even after forty-six years it is still well above the level of the unmanured plot.

In farm practice the good effect of farm-yard manure is intensified by another interesting property. It has a remarkable effect on increasing the growth of clover. This was well shown last year on the Little Hoos Field plots. Those which had received farm-yard manure in the preceding year, and even two or three years before, gave a much better crop than those which had only received artificials.

Treatment.	Dung for Previous Crop.	Artificials for Previous Crop.	No Manure for Previous Crop.
Yield of clover hay, cwts. per acre. .	65·6	41·9	41·1

When clover is good it makes the next crop also good, because it enriches the soil in organic matter and in nitrogen taken from the atmosphere. Thus, farm-yard manure not only itself adds to the organic matter of the soil, but also ensures a further supply through the agency of the clover crop.

The organic matter, however, can only act properly if it decomposes; undecomposed material, as already pointed out, is of no use, and may even be harmful. One of the first essentials in soil making is therefore to secure conditions favourable for the decomposition processes, or, in other words, for the organisms that bring it about. Earthworms begin the chain, bacteria carry it on: if a soil contains a good stock of earthworms the conditions may reasonably be assumed to be satisfactory. On the other hand, the formation of peaty layers, however thin—even if only a fraction of an inch—is evidence that decomposition is not proceeding normally. The soil population may suffer for various reasons: there may be insufficient lime for their needs, insufficient air or water, or too low a temperature. Whatever the cause of the suppression of the population the result is the same—a piling up of plant residues that ought to have been decomposed, and consequent inconvenience for the young plants that ought to grow and cannot.

Lime is an important requisite, though perhaps it can hardly be regarded as indispensable, because in many districts farmers and horticulturists have evolved schemes for managing without it. Perhaps it would be more correct to say that many of the soil organisms cannot tolerate acidity just as many cultivated plants cannot; and lime counteracts acidity. But the realm of Nature is very wide, and no particular group of soil organisms appears to be indispensable. In North Wales and in Aberdeenshire farmers do without lime on soils that would be utterly condemned in the south of England, not because they manage better, but because they manage differently. Potatos, swedes, and oats figure largely in their programme, and these crops, especially when heavily dressed with phosphates, stand less in need of lime than many others. So long as there is no actual layer of peat the disadvantages of a soil deficient in lime can be minimized by judicious cropping. But the presence of lime in the soil allows greater freedom of action, both in cropping and in cultivation, and we shall therefore continue to regard it as a prime factor in soil making.

Another factor more nearly indispensable is sufficiency of air in the soil, which in practice has to be brought about by removing excess of water and preventing the formation of a compact crust on the surface. A third is proper temperature, for if the soil is too cold decomposition does not go on.

Our general conclusion is, then, that the making of the soil requires three conditions: the proper mineral matter, organic matter, and conditions suitable for the decomposition of the organic matter.

We now turn to the vitally important question—Can we control the process of soil making?

The mineral matter lies outside our control: in a few special cases something can be done, but not much. If soil contains too much sand and is too light it can be ameliorated by the addition of clay.

This is an old device, far commoner in days gone by when labour was cheap than it has been in our time. In execution it was very similar to chalking, and the two were often confused under one name. PLINY tells us it was known to the Gauls and was generally known as "marling." WALTER of Henley in the thirteenth century emphatically recommends it. "Know for certain," he says, "that marl lasts longer than manure." "Marl the ground of the sheepfold every fortnight and let it be strewn on the top, and know you shall have from these more profit than if they lie in the fold." The author of "Seneschaucie" of the same period is equally emphatic. GERVASE MARKHAM wrote a book about it in 1625, but tells us tantalizingly little. Many instances are on record in the eighteenth and early nineteenth century journals of the cost and efficacy of marling: many survivals remain in names of lanes and fields. Marlpit Lane, Marlpit Field and similar names—all these go back to the days when men sought to control the mineral portions of the soil.

In Belgium and Denmark marling was still being done before the war: difficulties of labour and transit having been overcome by large scale working and the use of light railways. An instance is furnished by the intensively cultivated tract of land known as the Pays de Waes in Belgium. The soil is very light: in places it is even blown about by the wind. But clay lies near: it was brought in tramways, and laid on to a depth of about 4 inches. The soil then became very productive. Excellent results have also been obtained in Denmark, where, perhaps more than anywhere, the work has been put on a sound scientific and economic basis. Usually a district is marled by co-operation between farmers, whereby the cost of marl on the land is reduced to about 2 kroner (2*s.* 3*d.*) the cubic metre. This has necessitated the construction of light railways from the marl pit to the farm, and the work has been carried out by co-operative associations, often working on a loan from the State, free of interest and repayable in twenty-five years. Another method has been for the Society to buy moveable tracks and tip-trucks and to let them out to the farmer.

In England we have now given it up, excepting only in dealing with peat or moorland soils. There it is essential to secure some mineral matter. In the Fen districts west of the Ouse it is customary to dig down through the 5 or 6 feet of black Fen soil to the Kimmeridge clay below and haul it up to the surface. Prior to the war the work used to cost about 50*s.* an acre, but the improvement was abundantly worth while. In the Dutch and Belgian reclamation of moorland it is usual to add sand, and in a reclamation that is being attempted in this country where sand lies 9 inches below the surface the ploughing is done sufficiently deeply to bring some of it up.

In other cases, however, neither clay nor sand is generally added to the soil. Labour has become scarce and dear, and, more important still, farmers and horticulturists have learnt how to manage soils of the different types: they have evolved systems and methods suitable to light lands, to loams and to clays, and only novices and wealthy amateurs would seek to apply the wrong system to their land.

Further, much of the need for these additions has disappeared since artificial fertilizers came into use. Farmers and gardeners can now add to their soils in a concentrated form the phosphates and potash that formerly necessitated large additions of mineral matter if they were to be supplied at all.

The amount of organic matter is much more easily under control. It can be added in various ways: by dressings of farm-yard manure, or by imitating Nature and ploughing or digging in crops that have been grown for that purpose. This is one of the most efficient ways of making soil. Of all crops known leguminous crops are the best for the purpose. Some can be cut for hay or fed to live stock and will still leave enough residue to make an enormous difference to the stock of organic matter in the soil when the rest of the leaves, stems, and roots are ploughed in. Others are better ploughed straight in. This method of soil control is very ancient and goes back to the earliest days of agriculture. THEOPHRASTUS, writing 300 years before Christ, says that in Macedonia and Thessaly beans were grown to be ploughed in at flowering time. VARRO, about 50 B.C., says, "Some things should be sown with a view not so much to present profit as to next year's crop, because when cut down and left they improve the soil. Thus, lupins before they produce many pods, and sometimes beanstalks, if the podding stage be not so far advanced that it is profitable to pull the beans, are usually ploughed into poor land for manure."

The beneficial effect of the clover crop has been known from early times and was a great feature in the husbandry of Flanders, which has always been a model for the rest of Europe to follow. Thus, WESTON in 1650 writes: ". . . after that Crop is off, you may sowe the same Land with *Oats*; and upon them *Clover grass* seed onelie harrowing it with bushes, which will come up after the *Oats* are mowed, and that year yield you a verie great *Pasture* till Christmas; and the next year following you may cut that grass three times, and it will everie time bear such a burden, and so good to feed all sorts of Cattel as the best meadows in the Countrie do not yield the like." Instances could be multiplied to show the enormous benefits of leguminous crops on soil fertility. We might quote our older writers. YARANTON, who in 1663 declared that "clover doth so frame the land that being ploughed it will yield three or four years together a crop of wheat, and after that a crop of oats," becomes so enthusiastic that he bursts into song:

> "When poets call for aid, do they invoke
> The oyl of barley, hops, or Indian smoke?
> Must Bacchus fill their veins? these drown and smother
> And dull their wits; give me the oyl of clover,
> One drop of which contains such virtue in it
> It makes a perfect poet in a minute.
> I crave no aid; give me the goose's quill
> That's fed with clover, and I'll try my skill.
> But three-leaved grass soon yield a three-fold profit;
> Three volumes may be writ in praises of it."

Perhaps fortunately, he never carried out this intention. Or, again, we quote JETHRO TULL, who in 1730 instances a farm formerly let at £10 per annum rent (*i.e.* about 2*s*. an acre), "which, whilst in arable was like to have undone the tenant, but being all planted with St. Foin by the owner, was let at one hundred and ten pounds per annum and proved a good bargain." We might quote the Rothamsted experiments, showing that wheat grown after clover gives as good a crop as if it had received a heavy dressing of artificial fertilizers: or we could give numerous instances new and old from the United States.

Perhaps the most convincing evidence of all is the fact that farmers have universally adopted the practice, and regularly grow clover alone, or clover mixed with grass, every fourth or fifth year, sometimes leaving the mixture down for a period of years so as to intensify the effects.

The third factor in soil making can also be controlled—the securing of conditions necessary for decomposition of the organic matter. The soil organisms will do their work if they are given a chance: it is necessary to ensure that they get their chance.

Liming and drainage are the usual improvements wanted on the large scale: they must be followed by good cultivation and soil management. No short cuts are possible: deep digging in autumn, good tilths in spring, and ample surface cultivations in summer are all necessary. It is not my purpose now to go into the question of soil management: horticulturists recognize its need even though they sometimes fail to ensure it. Unless cultivation is good the soil organisms have no proper chance of working well.

Numerous attempts have been made to improve the soil population by adding certain strains of bacteria. Hitherto these attempts have succeeded only in a few rather special cases. In some of the Belgian and Dutch reclamations of heath land it has been found beneficial to apply a compost made by mixing ordinary soil and farm-yard manure. No great quantities are needed: only a few hundredweights an acre: but the effect is said to be very marked. A great part of the benefit is attributed to the bacteria thus introduced: the explanation seems reasonable. The micro-organic population of peat land, especially wet peat land, differs considerably from that of a normal arable soil. No doubt the change from wild conditions to the cultivated state would ultimately bring about a corresponding change in the micro-organic flora, just as a change in soil conditions brings about considerable change in the vegetation. But matters are hastened by judicious seeding, and it seems to be admitted that the clover crop benefits considerably. Attempts have also been made to introduce the organisms appropriate to the clover plant. If this could be done it would represent a great improvement—anything benefiting the clover crop naturally benefits the succeeding crop—and bacteriologists are still hoping to achieve the result. These efforts have met with some measure of success in the United States. They have also been somewhat successful in Germany. HILTNER, in a recent publication addressed to Bavarian farmers, strongly urges inoculation of leguminous crops as a means of increasing crop production. Unfortunately the method has not hitherto proved a success here; not on account of any inferiority on the part of our bacteriologists, but because in this country we have no wide stretches of virgin land only recently brought into cultivation, such as can be seen in the United States and in Germany. The subject is worth reopening, however, now that considerable quantities of grass land are being broken up, and in view of this new factor we are looking into the matter at Rothamsted.

Other methods of controlling the organisms are being attempted, notably by means of partial sterilization.

The process of soil making is very slow under natural conditions: Nature never hurries. We are watching the process at Rothamsted. A brick chamber has been constructed and it is filled with subsoil drawn from 12 ft. below the surface. The changes are being observed, but they are very slow. This is also brought out very clearly in the waste mounds of the Black Country in Staffordshire. An enormous area in this region is covered with spoil-heaps containing the refuse from coal-mines, furnace ashes, slags, &c. These were dumped as convenience dictated, and no attempt was made to keep them reasonably levelled, or to cover them with any of the soil that they gradually overspread. For over a century the dumping has continued, and now the heaps extend over many thousand acres of land. In 1866, however, a great area near Walsall was laid out as a public park, part of it being sown with grass and part being planted with trees. For the grass it was only necessary to pick up the surface, sow the seed, and give a good dressing of road-sweepings; nothing has been applied since. The trees were planted in pockets of earth, out of which, however, they have long since grown.

The original material was the shale—locally known as "clunch"—that forms the partings between the coal-seams, and had to be removed in great quantities during the working of the pit. It came out in flaky masses, but it speedily disintegrates to a clay that becomes extremely sticky in wet weather.

Both the grass and the trees have made satisfactory growth, and the Park is an admirable demonstration of the way in which an unsightly waste-heap can be converted into a picturesque pleasure-ground. Our interest, however, is in the soil changes. The raw mineral matter is gradually undergoing conversion into soil; but even after thirty years the process is still far from complete. There is as yet no notable difference between the surface and the lower layers, and nothing to mark out the surface-soil from the subsoil. The colour is uniformly greenish-grey, with no break anywhere and no sign of reddening. Chemical tests showed that some oxidation had taken place in the top 9 inches, the ferric iron being 50 per cent. of the total iron, while in the second 9 inches it was only 40 per cent. There is also more decaying organic matter in the top layer than lower down, and therefore more nitrogen. This will in time lead to the formation of a normal soil, but it has not yet done so. The numbers of bacteria are all very low, ranging from 0·2 to 3·5 millions per gram, and averaging 15 millions, while even in a poor normal soil they run about 6 to 10 millions per gram. There are not many earthworms yet. Further, the wild vegetation is mainly of the type that grows on exposed subsoils—*e.g.* coltsfoot, *Equisetum, Lotus corniculatus*, &c., although in many places some of the grasses are coming on. The analytical results are as follows :

—	Waste Heap Planted Thirty Years Ago.		Usual for Normal Soil of Similar Type.	
	Top 9″	2nd 9″	Top 9″	2nd 9″
Nitrogen, per cent.	0·11	0·07	0·18	0·10
Bacterial numbers, millions per gram.	1·5	0·2	5 to 10	

When the War is over the Allied nations will find themselves confronted by a great problem in soil making. Belts of country in Northern France, Belgium and Italy and Serbia have been considerably cut about by trenches and by shells. At present they have a very dreary appearance : devastated country is always sad to look upon. Perhaps some of the land is irretrievably ruined. But my own view is that a good deal of the damage, like that done in an air raid, is greater in appearance than in reality. A string of broken windows and a litter of broken glass give an impression of a wrecked thoroughfare, but an hour after the dustman and the glazier have finished their work the district is much as it was before.

When Peace comes the shell holes and the trenches will have to be filled and the land levelled—for unless the land is level little can be done. If this task proves physically impossible there may be nothing for it but afforestation on the affected area. But once the land is level the re-formation of the soil will not be beyond the resources of science. Alteration of the mineral particles is hardly likely to be attempted, but addition of organic matter will be quite feasible. Leguminous crops grown and ploughed in will greatly help in re-establishing the organic matter and the nitrogen supply ; lime, if needed, is fortunately close at hand in Northern France. Practical difficulties there will be, but nothing greater than our gallant Allies have already overcome. Science is now being used as an engine of destruction, but we are all hoping for the time when it can resume its proper function and serve as a great instrument for constructive purposes.

HOW AMATEURS MAY SECURE THREE SUCCESSIVE CROPS OF VEGETABLES IN TWELVE MONTHS WITHOUT THE AID OF GLASS HOUSES OR OF HEAT.

By ARTHUR W. SUTTON, J.P., F.L.S., V.M.H.

[Read October 22, 1918; Lord LAMBOURNE in the Chair.]

IN response to the invitation of the President and Council of the R.H.S. I have endeavoured in the following paper to indicate not merely the great benefit accruing from an additional crop of vegetables within twelve months, but to explain the extremely simple methods by which so desirable a result may be obtained.

It might be thought strange for the Council to invite one who is not a professional gardener, and one who, moreover, can make no claim to be even an amateur gardener, to deal with a subject which so directly concerns the cultivation of vegetables, but as mentioned in the admirable pamphlet issued by the Society in 1916, entitled "Autumn Vegetables," my firm made exhibits in the autumn of both 1914 and 1915, which were considered of considerable educational value, demonstrating the practical results which had followed the adoption of the advice given by Dr. KEEBLE and the Secretary in their letter to the Press at the first outbreak of the war—and some account of the methods of cultivation which led to these interesting exhibits may perhaps encourage others to adopt a similar course, and thus add greatly to the National Food Supply.

That the raising of *a third crop of vegetables in one year* has not become a general practice is unfortunately too true, and one may naturally be met with the criticism that had there been a reasonable prospect of success the methods advocated would have become the general rule rather than the exception. But gardeners, whether professional or amateur, are naturally disposed to follow the practice in regard to cropping that has been adopted for generations past, subject of course to such modifications as soil, climate, and locality may suggest, and hesitate to embark upon any new methods of which they have hitherto seen few, if any, examples in their own neighbourhood.

Besides this the results which have been obtained, and obtained so easily, by the course recommended, when brought together in the exhibits above referred to, have been so remarkable that doubt has even been expressed as to the correctness of the statements made in regard to the time of sowing, &c., and the opinion stated that the vegetables shown could not have been produced within so short a period.

I have thought it well to make these introductory remarks, and need perhaps only add that no gardener, professional or amateur, can have opportunities at all equal to those at the disposal of a large seed house for experimenting on an extensive scale or for studying the habits of the newer varieties of vegetables and their readiness to respond to exceptional treatment. An ordinary kitchen garden may be half an acre, or one or more acres in extent, a great portion being occupied with more or less permanent beds such as asparagus, bush fruits, and strawberries, as well as fruit trees. A seedsman's trial grounds may, on the other hand, extend up to fifty or one hundred acres, where every kind and variety of vegetables and flowers are tested every year for their relative usefulness, and as the crops are not cleared as soon as ready for consumption, endless experiments can be conducted in order to obtain increased knowledge as to the economic value of the plants under examination. Seeds often arrive from growers in foreign countries when the usual season for sowing is past, but they are sown on the chance that some interesting result may follow—and in this way it often happens that fresh knowledge is gained both as to the suitability of certain plants for sowing at other than the generally accepted time of year and as to their usefulness for cultivation in English gardens.

I may tell you that the date of every sowing in our experimental grounds is entered up in the trial books at the time of sowing, and can be referred to by visitors interested in any particular subject. Some idea of the possibilities for useful study may be gathered from the fact that in one season we have made sowings of 1,158 trials of Peas, 1,351 trials of Brassicas, such as Cauliflowers, Cabbage, Broccoli, Savoy, &c., 350 of Lettuce and Endive, 360 of Onions, and when I mention that some varieties of the same kind of vegetable come to maturity in less than half—sometimes in one-third—the time which others take, it will be evident that great possibilities exist for varying the usual routine of vegetable cultivation.

I have referred in the heading of this paper to a *third* crop of vegetables in one year, to make it quite clear that the course I am recommending will provide a crop which is entirely additional to the one or two crops usually grown.

Starting the year with January, in the early months we are utilizing first of all the later crops grown from the sowings made the previous spring—such as Savoys, Brussels Sprouts, Kales, Broccolis, &c.—and these are followed by crops grown from what have usually been called "autumn sowings," such as July and August sown Cabbages, transplanted in October and November, and coming into use from March to May or June according to locality and the varieties sown. Also July and August sown Lettuces, Winter Spinach, either the common prickly spinach or the much more useful Spinach-beet, sometimes called 'Perpetual Spinach,' a beet which produces an endless quantity of green foliage but with a fibrous root. The hardier varieties of Broccolis come into use from Christmas to May, and possibly

June, and these are followed by the September sowings of the early Cauliflowers, seed of which can only be grown in Holland and Denmark. It is not sufficiently known that these Cauliflowers, such as 'First Crop,' 'Snowball,' 'Magnum Bonum,' 'Purity,' 'Early London,' 'Walcheren,' &c., give heads double or treble the size, and of greatly superior quality if sown in September, sheltered during winter and transplanted during March, as compared with early sowings in January under glass or in the open as soon as weather permits—indeed the earliest varieties can scarcely be grown to advantage unless autumn sown. Later on, the autumn sown Onions are available, but perhaps not much earlier than those sown early in the year.

It will be seen from what I have already said that the early months of the year are well supplied with useful vegetables from sowings made in the previous year. But to follow these, gardeners who have the necessary facilities are busy from the early days of the year in raising vegetables from sowings under glass, and are thus able to provide abundant supplies during the early summer as evidenced by the wonderful exhibits staged at the R.H.S. Temple and Chelsea Shows.

Meanwhile in March and April everyone is busy making the annual spring sowings of vegetables for the general cropping of the garden, and these crops last according to their kinds, either a few weeks or months—but as soon as each kind has reached maturity we begin to see vacant spaces in the vegetable garden, and we realize all too soon that the season is over, and we must wait till the next year before we can again indulge our taste for such favourite dishes as Radishes, Spring Onions, Lettuces, Peas, Dwarf Beans, Spinach, tender Spring Cabbages, &c.

It is true that by successional sowings, or successional plantings from seed beds, the season may be extended, and also that by sowing very late varieties of Peas, supplies may be had late in the season, but we all know how susceptible the latter are to climatic conditions and how liable to failure from mildew.

We now, perhaps, understand how immense the gain would be if we could ensure from August and September onwards another crop of the vegetables we have appreciated so much during the summer months, and it is really remarkable that we have had to wait until the war for the simplicity with which these can be produced to be fully understood. It is not so much that gardeners and amateurs have not sown again in July and August, but they have sown their seed beds with the object of *transplanting* from them in the autumn for spring use, not knowing that by the simplest of all methods of cultivation the same crops which they generally utilize in the spring and early summer can be had fit for the table in September and October and in many cases throughout the winter months.

The whole secret lies in the fact that the seeds must be sown *where the crop is to stand* and no transplanting be done, except for the crops required in the spring and early summer. All that is needed is to sow *thinly* at the end of July or early in August, single out the plants at the earliest possible moment, and Nature will do all that is then needed to produce crops of the greatest value in the early autumn and throughout the winter.

I have, I think, correctly spoken of this as a third cropping during the year, for in the first place we have, as I have said, begun the year with crops sown the previous spring and autumn, and these are followed by the usual spring-sown crops, but then come the autumn months with little if anything left but winter vegetables, and an entire absence of the summer vegetables which were over far too quickly. It is here that another cropping becomes so valuable, and is at the same time so easily obtained.

The reason why vegetables mature so quickly under the treatment recommended is that during the summer months the earth has been storing up the sun's heat and consequently seeds sown at the end of July and in August find a warm seed bed, and not one that has only just escaped the rigours of a severe winter as in the case of spring sowings. The result is that with the first rains of August the growth of the seedling plants is phenomenal.

But this rapid maturity is not merely due to the stored up heat in the earth, but also to the fact that no check has been caused by transplanting.

The illustrations accompanying this lecture show something of the phenomenal growth referred to.

Fig. 1 is a general view of the plots in our grounds at Reading from seeds sown on July 15 of 1918. The photograph was taken exactly seven weeks after sowing, at which date we were able to exhibit in this Hall, Peas, Lettuces, Potatos, Spinach, &c., all in excellent condition, but of only seven weeks' growth. In the foreground on the right can be seen the Cabbage bed, whilst the Peas, Lettuces, Carrots, and Potatos are further in the background.

Fig. 2 is from a photograph of the Potato plot from tubers planted on July 15, and taken seven weeks after planting. New potatos are always a luxury, but if the plan advocated be followed, an abundant supply of young tubers may be had during the autumn months. It is of course essential that carefully selected tubers from the previous year's growth be kept over for the July planting. Sprouting must as far as possible be prevented or retarded, and an open situation be chosen away from trees, where the maximum of sunshine is secured and as little shade as possible. If this is done, potatos of excellent quality may be dug from September onwards, as shown by our exhibits on September 10 and 24, and in this Hall to-day. The varieties which we planted were 'May Queen,' 'Carisbrooke Castle,' 'Early Rose,' 'Supreme,' 'Epicure,' and others.

Some of the rows of Peas seven weeks after sowing were quite ready for gathering. Many gardens are entirely without Peas during August, September, and October, but from sowings made on July 15 delicious Peas were staged on September 10, September 24, and

FIG. 1.—GENERAL VIEW OF PLOTS SEVEN WEEKS AFTER SOWING SEED ON JULY 15.

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FIG. 2.—POTATOS PLANTED JULY 15, AFTER SEVEN WEEKS' GROWTH.

FIG. 3.—LONGSTANDING SPINACH SEVEN WEEKS AFTER SOWING ON JULY 15.

Fig. 4.—Lettuce 'White Heart Cos.'

Fig 5.—Perpetual or Spinach Beet. Summer sown.

Fig. 6.—Endive 'Exquisite.'

Fig. 7.—Carrot 'Inimitable Forcing.'

FIG. 8.—DWARF FRENCH BEAN 'NE PLUS ULTRA.'

Fig. 9.—Onion 'Improved Queen.'

Fig. 10.—Radish 'French Breakfast.'

Fig. 11.—Cabbage Plot twelve weeks from sowing.

Fig. 12.—Savoy Plot twelve weeks from sowing on July 15.

FIG. 13.—VEGETABLES FROM JULY SOWING EXHIBITED SEPT. 24, 1918, BY MESSRS. SUTTON.

[*To face p.* 17.

to-day. I must, however, caution those who would follow this course that it is essential to sow in July only *early* varieties of Peas, but as we now have by cross-breeding obtained the true marrowfat qualities in many of the earliest peas, we are no longer limited to the relatively tasteless varieties formerly known as early Peas. In the round-seeded types we found 'Bountiful,' 'Pilot,' 'Earliest Blue,' and 'Ringleader' to be most useful, whilst in the first early marrowfats, 'World's Record,' 'First of All,' 'Ideal,' 'Little Marvel,' all gave excellent results. Sown in April all these varieties would have taken eleven or twelve weeks to come to perfection.

Several varieties were included in the bed of Lettuces, but we found the best to heart up were 'Golden Ball,' 'A1,' and 'Standwell,' in the Cabbage section; our 'Little Gem,' 'Peerless,' and 'White Heart' in the Cos.

Figure 4 illustrates the 'White Heart' Lettuce when fully grown. Had all these varieties been transplanted they would not have hearted till the spring, but by the method adopted Lettuces fit for the exhibition table were ready in seven weeks from the date of sowing. A large number were exhibited by my firm both on September 10 and 24 in this Hall.

Spinach.—Fig. 3 shows a portion of the bed of Spinach seven weeks after sowing. How often would our cooks like to have fresh succulent spinach in August, September, and October, long after the spring-sown crops have run to seed! On September 10 we staged Spinach finer in quality than any which could be gathered in June and July, and the bed has remained in bearing up till the present time, very few of the plants having run to seed as they do so quickly when sown in the spring. Either the round or prickly seeded varieties can be grown, but of the two the round is preferable for this method of cultivation.

Spinach Beet.—This made marvellous growth as will be seen by the photograph (fig. 5) which represents plants only seven weeks from sowing. A very large quantity indeed can be gathered and the plants will continue bearing for months unless the winter be very severe. But even in such case a little protection will ensure a supply up till the spring.

Endives.—Both the curled types and the plain (Batavian or Scarole) answer admirably when grown under this system. The plants can, of course, be blanched by any of the usual methods.

Figure 6 is from a photograph of a good type of Curled Endive, the 'Exquisite,' when fully developed and blanched.

Dwarf Beans.—Those who have learned the French method of serving Haricots Verts will never be fully satisfied with the English Scarlet Runner, however invaluable a vegetable it may be for general use where large households have to be supplied. In favourable seasons abundant crops of Dwarf French Beans may be raised, if the right varieties are sown by the middle of July. In our exhibit on September 24 we were able to include Dwarf Beans ten weeks from the sowing, and figure 8 shows the variety which was the first fit to gather, the well-known 'Ne Plus Ultra.'

Carrots.—Much as we value the long roots obtainable from October onwards, we sorely miss the tender and delicious carrots from the forcing frames and early sowings of the spring. But by the present method fresh young carrots can be obtained in September and October, and by sowing broad-cast in August, tender young carrots can be pulled as required up till Christmas and later, no protection whatever being needed. But here again care must be taken to sow only the *early* maturing varieties.

Amongst the most suitable are 'Inimitable Forcing,' represented by this plate (fig. 7), also the 'Early Horn,' 'Early Gem,' and 'Champion Horn.' The type of the last is cylindrical, and it is practically the only variety without a centre core.

Beets.—People too often find their usual bed of spring-sown Beet insufficient for the requirements of the household, the supply being exhausted long before Easter. By the present method, fine young Beet of excellent flavour and colour can be ready for use in September and October, and these may be pulled as required without encroaching upon the main supply which should be stored for winter and spring use. The *Globe* varieties are the only ones which should be used for autumn sowing.

Turnips.—'White and Red Milan,' 'Snowball,' and 'Sixweeks' all answer admirably when sown in July and August, and the yellow-fleshed types, represented by 'Golden Ball' and 'Orange Jelly,' succeed far better than when grown during the hotter and dryer months of the summer. The roots are particularly juicy and much to be preferred to the larger Turnips which have been maturing slowly during the hot weather. 'Snowball' does well at all seasons, and 'White Milan' is one of the quickest Turnips to come to perfection.

Kohl Rabi.—This vegetable grows very rapidly indeed during the early autumn months, and the "bulbs" will remain in good condition for a very long time. Either the 'Early White' or 'Early Purple' may be grown. The merits of Kohl Rabi are not nearly so much known as they deserve to be. If cooked while fresh and young, the size of a tennis ball, the table quality may be placed midway between that of the Turnip and the Swede, and by some Kohl Rabi is preferred to either.

Onions.—Delicious 'Spring Onions' for saladings can easily be had in September, October, and even later, grown in precisely the same manner as the other subjects already dealt with, and for this purpose practically any variety may be sown, but if small bulbs are required, the quickly maturing varieties, such as 'Improved Queen' represented in figure 9, or 'Paris Silverskin,' must be used. Ten weeks after sowing we exhibited a nice dish of perfectly formed onions on September 24.

Radishes.—At this season of the year Radishes grow so quickly that those who do not care for them during the summer cannot fail to appreciate the crisp, juicy, tender roots. Practically any variety may be grown, but one of the best to respond to autumn sowing is the 'French Breakfast' shown in figure 10.

Winter Radishes.—For winter use 'Chinese Rose' or the 'Black Spanish' may be sown. These roots grow to a large size and remain solid and juicy for a long time. They can be left in the ground till required for use, and can be boiled like Turnips or used in a mixed salad. These types of Radish deserve far more extensive cultivation than they receive.

Other small saladings such as Mustard and Cress, Sorrel, and Corn Salad can easily be grown as well as the American or Land Cress.

Cabbage.—I have left the reference to Brassicas till the last because this affords a striking example of what can be accomplished by the method we are considering. In figure 11 will be seen the Cabbage bed only twelve weeks from sowing and in our exhibit in this Hall to-day we are able to show heads cut from this bed. Had the plants been treated in the ordinary way by sowing in July and transplanting in October, they would not have hearted up till March, April, or May of next year, but under this method of thinning out they came to maturity in twelve weeks, a saving of at least five or six months. 'Harbinger,' 'April,' and 'Flower of Spring' are all useful. The plants thinned out can, of course, be transplanted, when they will be fit to cut in the spring.

Cauliflower.—Cauliflowers may also be *sown where they are to stand,* on July 15, and duly thinned out. This is quite a unique way of growing Cauliflower, but we were able to cut heads twelve weeks after sowing and are exhibiting some to-day. The earliest variety for this purpose is 'First Crop,' and this is followed by 'Snowball' and 'Magnum Bonum.'

Savoys and Kales have also made exceptional growth, and the picture (fig. 12) gives a general view of the plot as it is at the present time. The autumn rains have caused the plants to grow most luxuriantly and they should greatly supplement the supply of winter greens.

We made an exhibit in the Hall in Vincent Square on November 17, 1914, from seeds sown after the declaration of War on August 4, and the Council awarded a Silver-gilt Knightian Medal. It contained a large amount of material and was an ocular demonstration of what could be done in so short a time. In 1915 we repeated our sowings with many more subjects, and the exhibit made on October 26, 1915, contained over twenty distinct kinds of vegetables, and to it a Silver-gilt Knightian Medal was awarded for its educational value.

In 1917 we made a similar exhibit and were awarded a Silver Knightian Medal.

During the present season we have grown many more types on the principle recommended and have already made three exhibits of the produce in this Hall. The first on September 10, the second on September 24, which is represented by figure 13, and the third exhibit is in this Hall to-day, and for each of these we were again awarded the Silver-gilt Medal.

If asked whether the results I have named can be obtained in any soil or in any part of the country, I should say that in almost any of the Southern Counties and South Midland Counties success may reasonably be expected in any average season. Farther north, somewhat earlier sowing would be necessary, and it is only natural that success must depend to a greater degree upon the season being a favourable one for such late sowing as I am advocating.

In gardens where space is limited, forethought should be used in the arrangement of the early summer crops of Vegetables, such as Lettuce, Spinach, Early Peas, and Potatos, so that sufficient ground may become vacant about the same time and so be brought into cultivation for the third crop, by sowing at the end of July and following the method I have described.

In conclusion I would express the hope that the efforts made by the R.H.S. to encourage the increased Production of Food from our Gardens—especially by the raising of Autumn Crops of Vegetables—may meet with continued success and that the work my firm has done in demonstrating the economic value of such crops may induce gardeners and amateurs to adopt the system which this lecture is intended to illustrate.

THE FOOD VALUE OF VEGETABLES.

By Fred Stoker, M.B., F.L.S.

[Read November 5, 1918; Rev. W. Wilks, M.A., V.M.H., in the Chair.]

I feel greatly honoured by being asked to lecture before this learned Society to-day, particularly upon this subject and at this time, when the produce of allotment and garden has had more than a small share towards securing the final victory we are now all looking forward to as not very far off. At the same time I am extremely diffident as to my capacity for doing justice to my subject, and I ask your indulgence for the many shortcomings which I fear will be only too apparent as I proceed.

Before the war, most of us ate vegetables simply as an adjunct to animal food, and do so still to a considerable extent; we either failed to appreciate their inherent food value or we refused to recognize it. As much, or nearly as much, meat was eaten when vegetables formed part of the meal as when they did not. We took, for example, nuts at the end of a meal simply because we liked nuts, and not because we required more food.

The last few years have shown us the wastefulness of such customs, have made us economize in animal food by substituting for it the fruits of the earth, with such benefit to our physical welfare that very few would be satisfied to return to the old régime.

Therefore it will be my endeavour in this address not only to indicate how best this substitution may be made, but also to point out how our gardens and allotments may be most *profitably* utilized so far as actual *food* is concerned.

To do this it is necessary to know what we demand of a substance before we describe it as a food, and how vegetables bear this test. Then we must have a method of ascertaining the actual nutrient value of a particular plant and also its relative value in proportion to the area it occupies, the time it is on the ground, and the cultivation it requires. From these data it is simple to arrive at the economic value, which, though not actually within the scope of this lecture, it may be interesting briefly to mention.

A food may be defined as a material which will supply energy, provide for growth, and make good the tissue-waste of an organism. Usually a mixture of complex chemical compounds, foods commonly contain many substances which are quite without value to the animal economy.

If any ordinary article of diet is analyzed, it is found to consist of certain organic compounds containing nitrogen—namely proteids and albuminoids; and others which are non-nitrogenous—to wit, fats and carbohydrates. Inorganic bodies are present in the shape of various mineral salts and water. Inasmuch as proteids, acting with salts and water, are the tissue-formers and are also energy providers, they are the only indispensable ingredients of a diet. Fats and carbohydrates, while they can both be stored in the body for an indefinite time, can only supply energy.

In judging of the usefulness or otherwise of a certain substance as food, it is not sufficient to know what quantities of fat, proteid, &c., it contains, but how much of these food elements can be absorbed. Absorption depends upon many factors; solubility in the digestive juices, the smell, taste and appearance of the food, and the condition of the body at the time of ingestion—all exercise an important influence. Violent exercise will hinder absorption, and too ample a meal will also considerably reduce it.

It has been found that proteids are the least completely absorbed of the three great food elements. On a purely vegetable diet the loss may be very great indeed, amounting in the case of carrots, for example, to nearly 40 per cent. of the total proteid consumed (Hutchinson).

The fats are more completely absorbed than proteids, but the absorption of carbohydrates is the most perfect of all.

It is worthy of note that there is least loss on absorption when a mixed diet is taken.

Besides its essential constituents, a food commonly contains a certain amount of indigestible matter. This, contrary to what might be thought, is by no means useless. It forms bulk or ballast, which by its merely mechanical effect stimulates intestinal action. This fact is taken due advantage of in drawing up a dietary in conditions in which intestinal inactivity is a prominent symptom.

And again, no discourse on food values could be complete without some reference to those curious chemical bodies called Vitamines. First discovered by Funk during his investigations into the cause of Beri-beri, they have called forth a great amount of research the last few years.

Funk found that when fowls were fed on polished rice they developed Beri-beri in from one to six weeks. and died in a few days after the onset of the disease. However, if an extract of rice polishings was injected into the circulation, the birds recovered magically in a few hours. Thus it was evident that a substance was present in the pericarp of the rice grain which, when removed from the diet allowed the disease to occur, but which was capable of curing the disease although the latter was fully developed. He isolated this body and named it "Vitamine." The quantity in any food is extremely minute, only 6·16 grains being obtained from 110 lb. of rice pericarps. Assuming the pericarp to weigh from one-sixth to one-tenth of the complete grain, we find that an amount of rice approximating to half a ton in weight is required to produce the merest pinch of vitamine.

This particular member of the group is soluble in alcohol and water, and is not destroyed by the temperature of boiling water.

Similar substances are found in fresh fruit and vegetables, but unfortunately some of them are broken up by boiling. A proof of their value, though long in receiving correct interpretation, was observed by the crews of sailing ships on far voyages. Long deprived of fresh food, an outbreak of scurvy was of so common an occurrence among them that lime juice became a fixed and recognized part of the plenishing of the ship. We read that Sir JAMES ROSS, during his Antarctic expedition, stopped at Kerguelen's Island for "South Sea Cabbage," and that his scurvy-ridden crew were much benefited thereby. HUTCHINSON, referring to the writings of LETHEBY, reminds us that we are told by the latter that Sir GILBERT BLANE, in his work on *Diseases of the Fleet*, alludes to the beneficial action of potatos in scurvy. That such a virtue resided in certain plants was common knowledge, as witness the name of "scurvy grass," an example of which we have on our own coasts in *Cochlearia officinalis*.

In this connexion, too, it is of interest to recall that BYWATER refers to the differing fattening qualities of two adjacent fields in the Romney Marsh, where the vegetation is apparently identical. The inference is naturally that the herbage of one contains vitamines in large quantity, while that of the other is deficient in that respect.

It is easily observed that when an animal is fed on vitamine-containing food the gain in weight is out of all proportion to the amount of food ingested. Thus it would seem that another attribute a vitamine possesses is to cause an increase in the assimilation of other foods taken by the animal. Therefore it follows that, providing vitamines are present in the diet, a much less amount of nourishment is required, and less strain is thrown on the organs of digestion and assimilation.

To summarize then :—

Vitamines are substances present in many foods including fresh vegetables and fruit.

They control growth and nutrition to such an extent that they are indispensable.

Their presence in a diet economizes food.

In treating of food values for our present purpose it is important to deal with those of cooked foods, as we are fortunately not in the unhappy case of that king of Babylon, who, as a punishment for his crimes, was made to eat his vegetables raw. Now in the usual plan of preparing vegetables for the table—namely by boiling—there is a considerable loss of nourishment. This occurs both by reason of the solvent action of boiling water and from the fact that many vegetables absorb a quantity of water in process of cooking. As an example of the first case, a carrot loses 25 per cent. of its total proteid on boiling. The loss in the second case is relative rather than actual ; it is evident that the same bulk of food contains less nutrients after the absorption of water than it did before. Thus parsnips gain 15 per cent., artichokes 11·6 per cent., and cabbage 8·5 per cent. of their original weight on boiling. Consequently, it is evident that a method of cooking which dispenses with the immersion of vegetables in boiling water will economize the foodstuffs present.

Thus we have seen that the usefulness of an ordinary vegetable to the human economy falls under three distinct headings, viz. :—

1. Food value, *i.e.* its richness in proteid, carbohydrate, fat, and salts.
2. Vitamine value.
3. Bulk value.

We cannot include the two latter items under any system of measurement as we can the first, but their presence should be carefully borne in mind. It may be assumed that more benefit will be derived from the Vitamine elements in those vegetables which are eaten raw or at any rate not boiled ; and as to bulk value, it is obvious that such vegetables as cabbages will possess it to a greater extent than, for example, legumes.

Food values pure and simple are expressed in terms of energy. Although the analogy is a rough one, the body may be compared to a steam engine. The energy required to drive the piston of the latter is procured by the combustion of fuel in the furnace. In the human engine food is burnt up, and the energy in that food, originally emanating from the sun and stored in plants, is liberated ; by means of it the body performs its functions, both automatic and volitional.

The unit of energy is called the big Calorie, hereafter simply named the Calorie ; it is arrived at by measuring the number of litres of water raised through 1° C. by burning 1 gramme of the food to be tested in a bomb calorimeter.

The values given by the main food elements are :

Proteid	4·1	Calories
Carbohydrate . . .	4·1	,,
Fat	9·3	,,

In working out the relative values of these elements in a given food, multiply the percentage of proteid fat or carbohydrate found on analysis by the above figures, and the result will express the total Calories yielded by proteid, &c., in 100 grammes of the food in question. On adding together the Calories given by each constituent, the total value of the food is arrived at.

For example, if on analysis a vegetable is found to contain of

Proteid	1	per cent.
Carbohydrate . . .	5·8	„
Fat	0·4	„

Then the energy value of 100 grammes would be:—

From proteid	$1 \times 4{\cdot}1 =$	4·1 Calories
„ carbohydrate	$5{\cdot}8 \times 4{\cdot}1 =$	23·78 „
„ fat	$0{\cdot}4 \times 9{\cdot}3 =$	3·72 „

Total Food Value = 31·60 Calories.

Turning now to the worth of particular vegetables or groups of vegetables, and beginning with the potato, we find that it owes its value principally to the large amount of absorbable carbohydrate it contains, and to a less extent to its proteid. Its vitamine value I have already referred to.

If a transverse section of a tuber be examined, three distinct layers can be made out. The central one constitutes the largest portion of the total bulk; this is enclosed by the fibro-vascular layer, somewhat darker in colour, making about one-twelfth of the entire tuber. This layer is rich in proteid. The outermost layer forms the skin.

If a potato is peeled before cooking, a large amount of the middle layer is usually cut away and thus a great deal of proteid is lost. And again in the boiling of a potato, particularly when peeled, a large amount of nutriment is dissolved out by the water. Therefore it follows that, to obtain the maximum of food from it, we must cook it by steam or by baking without removing the outer rind. By this means also the true flavour is preserved. An analysis of the absorbable food of the potato gives:—

Proteid.	Carbohydrate.	Fat.
0·9	19·1	0·1

and consequently the caloric value is 82·9.

Legumes.—The most noteworthy feature in the members of this group is their richness in proteid. They contain a proteid called "legumin" which closely resembles the casein of milk, and in some parts of the country a kind of cheese is made from it. Legumin combines with lime salts to form an insoluble compound, and therefore it is inadvisable to boil peas and beans in hard water without first precipitating the lime with bicarbonate of soda.

The legumes are also well provided with carbohydrates, but are poor in fats. Although they are not easily digested, they are well absorbed in the intestine and their nutritive value is high.

The habit of eating young kidney beans with their pods is not only altogether wasteful, but from a health standpoint very injudicious, as the large amount of cellulose present in the pods renders them difficult of digestion and assimilation.

An average of many analyses of cooked pulses, allowing for losses on absorption, is given below together with their caloric values :—

—	Proteid.	Carbohydrate.	Fat.	Calories per 100 grammes.
Green Peas (shelled) . .	4·0	15·5	0·5	84
Broad Beans (shelled) . .	6·1	24·1	0·3	126
Kidney Beans (cooked with pods)	1·5	3·7	0·2	23
Dutch Brown Beans (dried) .	21·1	50·2	2	311

Roots are of value principally for their contained salts and carbohydrates. Artichokes and carrots in particular are rich in the latter respect. On the other hand, the amount of proteid they contain is practically negligible. The body gains from them :—

—	Proteid	Carbohydrate.	Fat.	Calories per 100 grammes.
Carrots	0·35	2·75	0·17	16·28
Parsnips	0·14	1·18	0·29	8·09
Turnips	0·22	0·55	0·06	3·7
Beet-root	0·33	2·3	0·06	11·33
Artichokes	0·8	3·7	0·08	19·19

So far as *bulbs* are concerned the onion and leek are the only ones we need to consider. The former, so universally and justly esteemed as an indispensable vegetable, is valuable, not on account of the nutrients it contains, but for its salts and essential oil. There can be but little doubt that it contains a potent vitamine as well. At all events, onions are remarkable for their beneficial action upon inflamed mucous membranes and for their germicidal powers. Who has not heard of the miraculous cures of colds effected by onion "gruel"? Personally I have the greatest opinion of their virtue in this respect. Leeks, if they are done justice to in the kitchen, excel in flavour even asparagus in the opinion of many. They are rich in carbohydrates and in a lesser degree share the medicinal properties of the onion.

On absorption these are responsible for :—

—	Proteid.	Carbohydrate.	Fat.	Calories per 100 grammes.
Onion	0·3	1·7	0·1	9
Leek	0·4	4·1	0·2	20

Green Vegetables.—Under this heading I include cauliflower and celery. Their value principally lies in their salts, their vitamine bodies and their property of adding bulk to the diet.

As foods pure and simple they give :—

—	Proteid.	Carbohydrate.	Fat.	Calories per 100 grammes.
Cabbage	0·2	0·3	0·1	2·98
Cauliflower (head) . .	0·7	0·3	0·4	11·9
Spinach	0·5	0·4	0·2	5·5
Sprouts	0·18	0·4	0·1	3·3
Celery (boiled) . . .	0·1	0·2	0·06	1·7

And now to consider briefly the *economic* values of some of the more popular and useful vegetables. These calculations have been made from this year's crops with the exception of the parsnip results, which are from last season. I would like at this point to express my great indebtedness to my co-worker, Mr. GEO. BALDWIN, F.R.H.S., without whose assistance these records would not have been obtained.

The method adopted was to weigh the seed necessary to plant a fixed area of ground, and to add to the cost of the latter the expenses involved in labour and manures, then to observe the period the crops occupied the ground, and eventually to weigh the harvested crop.

In the case of potatos two varieties were tested, viz. 'Windsor Castle' and 'Gordon Castle.' Seven rods were planted in each case with 56 lb. of "seed." The detailed cost of the crops were, with 'Windsor Castle':

	£	s.	d.
Cost of seed		14	0
Farm manure, 1 ton		10	0
Prentice's manure, 14 lb. . . .		2	6
Cost of labour for—			
Digging		14	0
Hoeing		5	0
Earthing		5	0
Harvesting		7	6
Spraying (twice)		12	6
	£3	10	6

The weight of the crop was 11 cwt., *i.e.* 176 lb. to the rod.

In the case of 'Gordon Castle,' the cost of seed was 21*s.*, the other expenses being the same. The yield was 17 cwt., *i.e.* 272 lb. to the rod. Therefore the cost per rod of 'Windsor Castle' was 10*s.* for 176 lb. and of 'Gordon Castle' 11*s.* for 272 lb.

The time the ground was occupied in both instances was twenty-one weeks.

Dried Dwarf Beans.—Two varieties were grown, 'Dutch Brown,' and 'Everbearing Dwarf White.' One rod of ground was allotted to each. The costs of the crops and results are given below.

	Dutch Brown.	Everbearing Dwarf White.
Amount of seed	4 oz.	3 oz.
Cost of seed	4½*d.*	3½*d.*
Cost of farm manure (2 cwt.) . .	2*s.* 0*d.*	2*s.* 0*d.*
Cost of basic slag	6*d.*	6*d.*
Cost of labour	6*s.* 0*d.*	6*s.* 0*d.*
Total cost	8*s.* 10½*d.* (say 9*s.* for 15 lb. produce)	8*s.* 9½*d.* (say 9*s.* for 12 lb. produce)
Time in ground	18 weeks	18 weeks

Parsnip.—Variety used, 'Student.' No manure used, the ground being heavily manured the previous season for peas. Having regard to the subsequent remarks on the subject, it is fair to charge for manure at the rate of 9*d.* a rod. Expenses incurred for cultivation of one rod:—

	s.	*d.*
Manure		9
Seed	1	0
Digging	2	0
Sowing, cultivating, and harvesting	6	0
Total cost	9	9

Yield from one rod 480 lb. Time required to reach maturity 26 weeks.

Carrot.—'Red Intermediate.' In regard to manure this crop was in the same position as the previous one.

Cost of growing one rod:—

	s.	*d.*
Seed	1	3
Manure		9
Digging	2	0
Sowing, cultivation, and harvesting	5	0
Total cost	9	0

Yield 392 lb. Time on the ground 22 weeks.

Peas.—Three varieties were taken, viz. 'Bountiful,' 'Pioneer,' and 'Up-to-Date.' One row of each, 38 yds. long, was sown, the rows being 6 ft. apart and inter-cropped with spinach and cauliflowers. Thus I think it will be fair to allow the rows of peas to be 3 ft. wide, leaving 3 ft. for the inter-crops. Farm-yard manure was dug in at the rate of 2½ cwt. to the rod, but as the following crop did not receive any manure with the exception of a little soot, and as the peas would enrich the ground in nitrogen, I suggest that only half the cost of the manure be debited to the peas.

The yields per rod were:—

	Peas in pods. lb.	Shelled peas. lb.
Bountiful	111	48½
Pioneer	124	66
Up-to-Date	135	76

Thus taking an average of these amounts we have 123 lb. and 63 lb. The other charges (average) on each rod were—

	s.	*d.*
Farm manure		9
Digging	2	0
Hoeing, sticks, and staking	9	0
Seed	2	2
Total cost per rod	13	11

Time ground occupied 21 weeks.

Cabbage.—'Ellam's Early' was used; the ground was previously occupied by onions, and consequently only a little nitrogenous manure was used in the form of soot.

The heads averaged 1 lb. 12 oz. each, and the total yield from one rod was 93 lb.

Onion.—'Sutton's Ailsa Craig' was raised under glass and planted out, while 'Sutton's Improved Reading' was sown out of doors.

Cost entailed for one rod of each variety:

	Ailsa Craig. £ s. d.	Improved Reading. s. d.
Seed	1 0	3 0
Farm manure	5 0	5 0
Soot	6	9
Total labour	17 0	8 0
Rent of glass	6	—
Total cost	£1 4 0	16 9
Yield	245 lb.	210 lb.
Time in ground	19½ weeks.	26 weeks.

To arrive at a means of calculating the economic value we must decide upon a unit of gain and also a unit of expense, and divide the former by the latter. This will give the number of units of gain for one unit of expense, and we may call the result the "economic value," but it must be fully understood that this term only applies in a gardening sense, when the produce is not sold for profit.

I have devised the following formula which I think will meet our requirements:—

$$\frac{\text{Caloric Value} \times \text{Yield in pounds per rod}}{\text{Cost of crop in shillings} \times \text{Number of weeks the ground is occupied}} = \text{Economic Value}$$

In setting down the Caloric Values the nearest whole number will be taken. Applying this formula to our previous results we find that:

Potato 'Windsor Castle' gives—

$$\frac{83 \times 176}{10 \times 21} = \frac{14608}{210} = \text{approx. } 69{\cdot}5 \text{ as its Economic Value.}$$

Potato 'Gordon Castle' gives—

$$\frac{83 \times 272}{11 \times 21} = \frac{22576}{231} = \text{approx. } 97{\cdot}7 \quad \text{,,} \quad \text{,,}$$

Peas give—

$$\frac{84 \times 63}{13{\cdot}8 \times 21} = \frac{5292}{289{\cdot}8} = \text{approx. } 18 \text{ Economic Units.}$$

Dried Kidney Beans:

'Dutch Brown' give—

$$\frac{311 \times 15}{9 \times 18} = \frac{4665}{162} = \text{approx. } 28 \quad \text{,,}$$

'Everbearing White' give—

$$\frac{311 \times 12}{9 \times 18} = \frac{3732}{162} = \text{approx. } 23 \quad \text{,,}$$

Carrots give—

$$\frac{16 \times 392}{9 \times 22} = \frac{6272}{198} = \text{approx. } 31{\cdot}6 \quad \text{,,}$$

Parsnips give—

$$\frac{8 \times 480}{9{\cdot}5 \times 26} = \frac{3840}{247} = \text{approx. } 15{\cdot}5 \text{ Economic Units.}$$

Onion 'Ailsa Craig' gives—

$$\frac{9 \times 245}{24 \times 19{\cdot}5} = \frac{2205}{488} = \text{approx. } 5 \quad \text{"}$$

Onion 'Improved Reading' gives—

$$\frac{9 \times 210}{16{\cdot}75 \times 26} = \frac{1890}{435{\cdot}5} = \text{approx. } 4{\cdot}3 \quad \text{"}$$

Cabbage gives—

$$\frac{\times 93}{5{\cdot}3 \times 18} = \frac{279}{95{\cdot}4} = \text{approx. } 3 \quad \text{"}$$

I feel I must apologize for inflicting so much arithmetic upon you, but if you will bear with me just a little longer, I will finish.

We may now construct a list showing the comparative values of the principal vegetables.

Crop.	Yield in lb. per rod.	Assimilable Calories per rod.	P incipally valuable for	Economic Value.
Potato . . .	176	73,040	Carbohydrate	69·5
Peas (*shelled*) . .	63	26,460	Proteid	18
Kidney Beans (*dry*) .	15	23,325	Proteid	28
Carrots . . .	392	31,360	Carbohydrate	31·6
Parsnip . . .	480	19,200	Carbohydrate	15·5
Onion . . .	210	9,450	Oil and vitamine	4·3
Cabbage . . .	93	1,395	Salts and bulk	3

Before concluding, it is necessary to remind you that all the analyses I have given are perforce only approximate. The varying composition of the foods, and the differing assimilations of the recipients render any fixed amounts out of the question. Still, I venture to hope that the information as I have set it forth has not been altogether dreary to you, and if I have aroused your interest and demonstrated the value of your gardens I am amply rewarded.

ROOT-KNOT DISEASE OF TOMATOS.

Records of Field Experiments on Tomato Sub-soils infested with Eelworms—*Heterodera radicicola*.

By R. Robson, M.Sc.

Following an inquiry from Mr. E. Cousins, of Chelmsford, respecting methods of eradicating Tomato Club Disease from a number of greenhouses, certain experiments were carried out during the seasons 1915, 1916, and 1917.

The information available at the time dealing with this problem is summarized in (1) The Board of Agriculture Leaflet, No. 75, where carbolic acid, gas-lime, naphthalene, and sulphate of potash are referred to as substances more or less efficacious. (2) The *Board of Agriculture Journal*, January 1912, where the effects of steaming the soil and the use of toluol and carbon bisulphide in sick soils are recounted, and in (3) the *Journal of the Department of Agriculture and Technical Institute for Ireland*, January 1914, where the value of copper sulphate in cases of eelworm disease in bulbs is described.

The question of steaming the soil was considered, but given up because of the great expense that would be entailed, since no steaming plant was available. Time also was a consideration, as only the months of December and January were at our disposal. In any case the top soil was to be removed and replaced by virgin soil, plenty of the latter being available, change of soil being an annual routine matter in the nursery.

Treatment with chemical substances seemed to be the only plan possible under the circumstances, and the Board of Agriculture recommendation to use carbolic acid was considered. The Leaflet recommends:

1. "To destroy these eelworms the soil must be thoroughly saturated three times, at intervals of a fortnight, with a solution of one part of carbolic acid in twenty parts of water."

3. "When soil in a house is infected, it is safest to remove the whole and treat it outside; the interior of the house should then be thoroughly washed with a solution of one part of carbolic acid in eight parts of water."

Soil treatment recommendations must stand or fall according to the cost involved. If the saturation of a square foot of soil to a depth of 9 inches cannot be effected with less than 1 gallon of water or water solution, then 1 acre of ground, saturated three times with carbolic acid solution (1 in 20), requires of carbolic acid—

$$3 \times 4840 \times 9 \times \frac{1}{20} = 6{,}534 \text{ gallons},$$

costing, at 3*s*. a gallon, £980 2*s*.

The washing of the whole of the inside of the greenhouse with carbolic (1 in 8) after the removal of the top soil involves the washing of the subsoil which has been penetrated by the roots of the tomatos. Less than $\frac{1}{2}$ gallon to the square foot of subsoil surface would be out of the question, and the treatment of 1 acre of subsoil at $\frac{1}{2}$ gallon to the square foot with carbolic acid (1 in 8), "liquid carbolic acid" being sold at 3*s.* per gallon, would cost £4,840 $\times$ 9 $\times$ $\frac{1}{2}$ $\times$ $\frac{1}{8}$ $\times$ 3/20 = £408 7*s.* 6*d.*

Of course such treatment is permissible on a small scale, and the recommendation answers admirably where the grower takes things in time and stamps out the disease thereby on its first appearance. But where, as in many nurseries, the disease has spread over a large number of houses the method above advocated becomes rather costly.

It should be borne in mind also that a large number of proprietary substances are on the market, by the application of which in rather small quantities the makers and vendors claim that the disease in question can be eradicated. For example, the directions for use given with one of these substances may be summarized as follows:

"Apply a solution of 1 in 40 at the rate of $\frac{1}{2}$ gallon per square yard."

Taking the price at, say, 2*s.* a gallon, the cost for an acre is 2*s.* $\times$ 4,840 $\times$ $\frac{1}{2}$ $\times$ 1/40 = £6 1*s.* At 5*s.* a gallon the cost would be only £15 2*s.* 6*d.*

Another substance, "for badly diseased soil," is advised at a strength of 1 in 64, one gallon of solution to the square yard, the price being, say, 2*s.* a gallon. The cost is only 2*s.* $\times$ 4,840 $\times$ 1/64 = £7 11*s.* 3*d.* an acre.

Furthermore certain growers who have tried one or other of these substances have expressed the opinion that the results were salutary. Such being the case, the huge disparity between the cost of a pure carbolic acid treatment and that of the substances just referred to is too great to be ignored, at any rate by a tomato-grower. His disposition is such that he will not have an experimental plot—even if at somebody else's expense—involving a cost of £980 an acre. On the other hand, he will shoulder a £6 an acre outlay with comparative joy, even if the joy is somewhat tinged with scepticism.

The leaflet (No. 75) referred to above also recommends (2) an intimate mixture of the soil with gas-lime. As gas-lime is not now on the market because of the substitution of "oxide" for the quicklime in gas works, this recommendation is not now a practical one. Naphthalene and sulphate of potash are also mentioned.

As not all proprietary sterilizers are composed of carbolic acid, sulphate of potash, and naphthalene, it is evident that there was room for experimentation with a variety of likely soil sterilizers; so trial plots with twenty-six different substances were laid down in 1915.

The houses in which the experiments were carried out were all

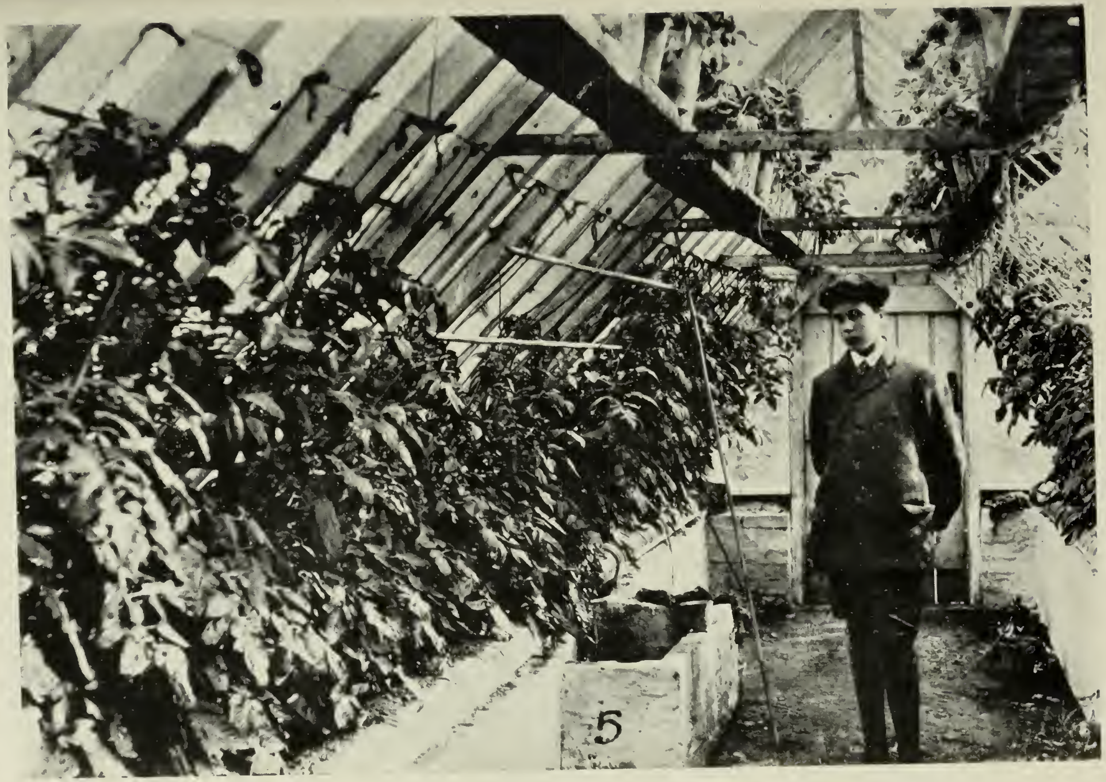

FIG 14.—A length of 10 feet where subsoil was treated with kainit (6 tons to the acre). The lower horizontal bamboo shows the height of the stunted plants; the higher horizontal bamboo shows the average height in the house.

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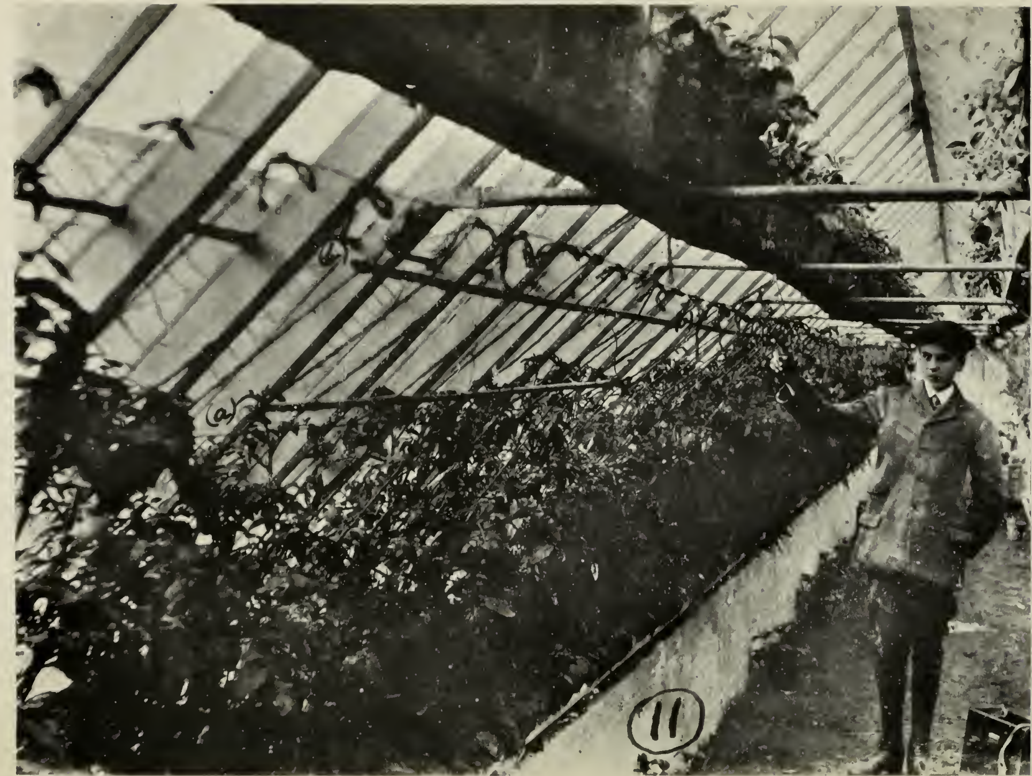

Fig. 15.—A length of 15 feet treated with kainit (6 cwt. to the acre). The lower horizontal bamboo (*a a*) shows the height of the stunted plants, the upper (*b b*) the average height of the tomatos in the house.

100 feet long, with beds $2\frac{1}{2}$ feet wide on either side. These beds were raised above the ground level, the top level of the growing soil being about 18 inches above the floor level, and the subsoil of the beds about 9 inches above the floor level. To insure a healthy crop the grower put in virgin soil every year, but he found that the infection remained in the subsoil, and year after year the tomatos at certain marked places were invariably "clubbed."

These infected places became more extensive each year, and when the soil was being taken out particles of infected soil were carried or brushed to other places so that the number of "club" areas increased in this way also. On several occasions he had the subsoil dug out at such places and a fresh subsoil put in. In every case he found, however, that after the lapse of one year or two the disease reappeared at the same places, so this plan was abandoned. His difficulty therefore lay in the subsoil and the containing walls, and on consideration of the matter it appeared reasonable and safe to treat these subsoils with substances which it would perhaps be rather rash to use in the actual growing soil.

It was therefore assumed at the commencement of the experiment that:

1. The substances used would probably inhibit the development of the eelworms or kill them outright.

2. The roots of the tomatos would not grow down into the subsoil if the substances therein were noxious.

3. That the noxious substances would gradually descend because of the watering of the tomatos during the growing season.

4. That, as the substances gradually descended, a poison-stratum (more or less) would prevent the ascent of the worms and the latter would either be killed in this way or at any rate be kept from the plants.

5. That the tomatos had plenty of soil room and nourishment in the top layer of soil and need not descend into the subsoil.

Preparatory Work.

In the season 1914 the tomato crop had been followed by a cucumber crop, which had suffered in some of the houses from certain fungus diseases. As a precaution against a repetition of this in 1915, the subsoil and pathways were watered with a solution of copper sulphate, 6 lb. to 60 gallons of water to 2 square rods of subsoil. The glass, woodwork, and walls were sprayed all over with dilute formaldehyde, 2 pints of commercial formaldehyde to 30 gallons of water. After spraying, the doors and ventilators of each house were closed and remained so till the fumes of formaldehyde could no longer be smelt.

After this the subsoil, where diseased, was forked over 3 inches deep and treated further as described later on.

When the various substances had been watered into the subsoil and walls (as far as possible), they were watered about a week later with plain water and then sprinkled with hot lime. A layer of spent tan 1 inch thick was then put on the subsoil throughout every house, treated and untreated alike. The fresh virgin soil previously mixed with farmyard and artificial manures was placed in the houses about a fortnight after the plots had been chemically treated.

The ends of each plot were indicated throughout the growing season by vertical lines of paint on the whitewash of the walls.

Selection of the Plots for Experimentation.

During the seasons immediately preceding that of the experiment here described, the owner of the greenhouses had made a practice of marking the places where diseased plants (*i.e.* plants with nodulated roots) were found. The diseased places were therefore located without difficulty, and each plot of ground selected for experiment included one or more of these infected places. To make sure of the presence of the disease (as well as to determine the limits of the plot), the subsoil was in all cases forked over to a depth of 3 inches, and if nodules were found therein the place was chosen.

Though the selected plots were in this way proved to harbour the parasite in the subsoil, yet it is to be clearly pointed out that the infection was not equal. For example, Plots 23, 24, 20, 29, 4, &c. were very heavily infected, whilst Plots 1, 9, 36, 37, 39, &c. were less so. The plots were of varying lengths according to the lengths of diseased subsoil found at each place.

Difficulties.

From the experimental point of view this inequality in the infection was rather unfortunate, but in the circumstances one could not make an attempt to infect each one heavily before treatment. Unfortunately, too, the area at our disposal was not great enough to have a full series for each trial substance, and to make a large number of comparatively tiny plots would have been out of the question. It was simply a matter of trying as many substances as the number of infected places admitted of, and gaining as much information as the circumstances allowed. Even in the first year, difficulties occurred in getting some of the substances for experiment, and each year this difficulty increased.

Treatment of Subsoil.

Trial Substances.—In 1915 the substances tried were as follows:

1	*Mineral Acids* . .	Nitric acid and Chromic acid.
2	*Alkalies* . . .	Caustic soda.

3	*Mineral Salts* . .	Sulphate of potash. Kainit. Potassium permanganate. Potassium bichromate. Common salt. Bleaching powder. Copper sulphate. Mercury bichloride. Potassium cyanide.
4	*Elements* . . .	Sulphur.
5	*Disinfectant Fluids, mainly Proprietary*	Black carbolic disinfectant. Carbosol. Clubicide. Creol. Izal. Jeyes' Fluid. Lysol. Evans's Soil Sterilizer.
6	*Bye-products from Coal, Wood, &c.*	Phenol.
7	*Powders.* . . .	Vaporite. "V.C." Powder. "V.N." Powder. Soot.

In applying these substances, the Vaporite, "V.C." Powder, "V.N." Powder, Naphthalene, and Sulphur were carefully worked into the subsoil dry. The others were applied as watery solutions.

We found on trial that we could not satisfactorily put on more than 1 gallon to the 2 square feet, and this penetrated to a depth of about 5 inches, the top three inches being loose because of the digging. That rate of watering was therefore adopted and the quantities used to the acre with the strength of solution employed in each case is given in the following table. A week afterwards, as before remarked, all the places were again watered with plain water.

TABLE I.—SUBSTANCES USED ON PLOTS IN SEASON 1915, WITH QUANTITIES AND COST PER ACRE.

		Plot.	Substance applied.	Quantity per acre.		Dilution.	Price for Calculation.*	Cost per acre.
								£
Acids	1	1	Nitric acid	138	cwt.	1/10	4*d*. per lb.	255
		2	,,	69	,,	1/25	4*d*. ,,	127
		21	Chromic acid	9·7	,,	1/160	9*d*. ,,	40
Alkalies	2	20	Caustic soda	16	,,	1/100	25*s*. per cwt.	20
Elements	3	27	Sulphur	30	,,	dry	12*s*. 6*d*. ,,	19
Mineral Salts	4	3	Potass. sulphate	121	,,	1/14	£14 per ton	84
		5	Kainit	121	,,	1/14	70*s*. per cwt.	21
		11	,,	68	,,	1/25	70*s*. ,,	12
		7	Common salt	69	,,	1/25	2*s*. 6*d*. ,,	9
		9	Copper sulphate	34·5	,,	2/100	£50 per ton	86
		8	Potass. permang.	26	,,	1/60	7*d*. per lb.	84
		18	,,	2·6	,,	1/600	7*d*. ,,	8
		17	Chlorinated lime	44·5	,,	dry	15*s*. per cwt.	33
		37	,,	25	,,	dry	15*s*. ,,	19
		22	Pot. bichromate	14	,,	1/120	6*d*. per lb.	38
		23	Merc. bichloride	7·78	,,	1/500	3*s*. per lb.	129

* These are pre-war prices for purchases in small quantities at a time.

TABLE I.—(*cont.*).

	Plot.	Substance applied.	Quantity per acre.	Dilution.	Price for Calculation.*	Cost per acre.
						£
Mineral Salts 4	29	Merc. bichloride	2·6 cwt.	1/500	3s. per lb.	43
	24	Pot. cyanide	10·6 ,,	1/115	1s. ,,	59
	41	,,	9 ,,	1/150	1s. ,,	50
	46	{ Caustic soda and Kainit	12·4 ,, 86 ,,	1/100 1/20	25s. per cwt. 70s. per ton	} 31
Coal-tar derivatives 5	4	Phenol	42 ,,	1/40	1s. per lb.	232
	31	,,	15·56 ,,	1/100	1s. per lb.	86
Proprietary 6 Disinfectant Fluids	14	Black carbolic disinfectant	230 gal.	1/80	say 2s. per gallon	23
	39	,,	128 ,,	1/130	,,	13
	10	Izal	335 ,,	1/56	,,	33
	43	,,	121 ,,	1/144	,,	12
	15	Jeyes' Fluid	242 ,,	1/90	,,	24
	42	,,	121 ,,	1/144	,,	12
	19	Lysol	312 ,,	1/56	,,	31
	26	,,	182 ,,	1/100	,,	18
	33	Creol	261 ,,	1/30	,,	26
	6	Clubicide	39 cwt.	1/40	,,	39
	44	,,	115 gal.	1/150	,,	11
	45	Carbosol	115 ,,	1/150	,,	11
	32	Evans's Soil Sterilizer	52·5 ,,	1/250	,,	£5 10s.
Powders 7	34	"V.C."	53 cwt.	dry		
	35	"V.N."	56 ,,	dry		
	36	Vaporite	14·8 ,,	dry	£10 per ton	7
	25	Soot	heavy dressing	dry		

* These are pre-war prices for purchases in small quantities at a time.

The young tomatos were transplanted into the soil in February and grew normally, with the exception of the plants over the subsoils containing the chromic acid, potassium bichromate, the heavy dressing of mercury chloride, kainit, salt, and bleaching powder. On all of them a crop was produced of course, the produce of that over mercury bichloride being eaten by the experimenters. The chromium substances, nitric acid, kainit, and bleaching powder were not tried after 1915. The remarks on the effects of these substances are given later. Photographs of all the plots were tăken during the growing season.

REGISTRATION AND INTERPRETATION OF OBSERVATIONS.

In the autumn of every year after the whole crop had been gathered the plants were dug up, the soil carefully shaken off the roots, and each root system was inspected for the presence of nodules. The finest roots in the portions of soil were also examined by crushing the lumps so that no nodule was missed. Afterwards the upper layer of the subsoil was examined for nodules and each result was marked on the wall of the bed and on the plan of the greenhouse.

The roots grown on the various plots were photographed in 1915, but in 1916 and 1917 this was not done. A system of marking the degree of infection was adopted which we found suitable for indicating changes occurring in the treated areas. When infected areas were treated with sterilizing substances it was anticipated that at the end of the season not a single nodule large or small would be found. Such a result is marked—O.

If, however, any nodule was found, say, of the size of a small pinhead—1 mm. diameter—the infection remained, and it had to be marked accordingly. If in a 10-foot length of bed from 1 to 6 nodules were found of a size not greater than mentioned above, and located *in the soil immediately overlying the subsoil* from which the eelworms had travelled, or if these same half-dozen small nodules were found *in the subsoil*, the infection was considered to be a trace—Tr. (In no single case was a plant found with a few nodules near the surface without having the lower roots covered with nodules.)

If the nodules were more numerous, the next obvious difference was between old nodules and young nodules. Where the nodules were small up to $\frac{1}{8}$ inch diameter, whitish in colour, succulent in appearance and occurring on the deeper roots, a later attack of the disease was indicated than would be the case where the nodules were large ($\frac{1}{4}$ inch to $\frac{1}{2}$ inch diameter), brownish in colour, and situated in the higher as well as in the lower roots. Where the disease had been heavily checked, only the smaller nodules, and these deeply seated, were discernible. Where less than a quarter of the plants had these small nodules the infection was marked X.

Where less than a half of the plants had these small nodules the infection was marked XX.

Where old, brown, large nodules were found they indicated an early attack by the eelworms, and it was to be inferred that the substance applied had shown little inhibiting effect even at the beginning of the season. When old nodules were found in *one* up to a quarter of the plants in the plot, the infection was marked XXX.

Where more than a quarter of the plants on the plots showed old nodules the infection was marked XXXX.

Marks Tr, X, and XX are therefore distinguished from the others as indicating a late attack, from which it was inferred that the applied substance had at least formed a poisoned stratum for a time impassable by the worms.

Marks XXX, XXXX are alike in that they indicate an early attack by the worms, and one would therefore infer that no appreciable poison-stratum had been formed and that the worm-killing power at the time of application had not been sufficiently great.

This is summarized in the following table (II.) :

TABLE II.

No nodules	—	O
Young, small nodules	1 to 6 nodules present in 10-ft. plot .	Tr
	Where only a few plants, less than 25 per cent. of the plants had small nodules	X
	Where 25 per cent. or more had small nodules up to $\frac{1}{8}$ inch . . .	XX

Old nodules, large ¼ inch–½ inch, and brown	Where a small number of the plants (less than 25 per cent.) had large nodules, ¼ inch–½ inch diameter . . .	XXX
	Where 25 per cent. of the plants had large, old nodules, ¼ inch–½ inch diameter	XXXX

The distinction between early and late attacks by the worms as they ascended from the subsoil is fortunately well illustrated in the results of the first season, 1915. In that year the tomatos were hurried off in order to grow a crop of cucumbers for the autumn. The roots of the tomatos were examined as described and a record taken. When the cucumber roots were taken up in November it was found that sometimes the cucumbers were nodulated on the places where the tomatos had *not* been attacked. Of course, wherever the tomatos had been attacked, the cucumbers were, later on, more heavily infected. This result is indicated in Table III.,

where p (present) means *Nodules found.*
a (absent) means *No Nodules found.*

Tomatos were grown in the soil from March to August 1915, and cucumbers grew in the soil from August to November 1915.

Results of Season 1915.

In judging the results of the first season (1915) it is helpful to place side by side :

1. The result of the tomatos and cucumbers in respect of the mere absence or presence of nodules. (Table III.)

2. The degrees of infection of each plot at the beginning and end of the season. (Table IV.)

3. The list of substances which in one way or another were harmful to the tomatos. (Table V.)

Tables III., IV., V.—Analysis of Results of Season 1915.

	III.		IV.		V.
No. of Plot.	Nodules in Tomato Roots. p=found a=not found.	Nodules in Cucumber Roots. p=found a=not found.	Degree of Infection at End of 1914 Season.	Degree of Infection at End of 1915 Season.	Injurious Effect on Tomatos.
1	a	a	X	O	...
4	a	a	XXXX	O	...
5	a	a	XXXX	O	i
6	a	a	XX	O	...
7	a	a	XXX	O	i
8	a	a	X	O	...
9	a	a	X	O	...
11	a	a	X	O	i
21	a	a	XX	O	i
22	a	a	XX	O	i
23	a	a	XXXX	O	i
24	a	a	XXX	O	...
26	a	a	XX	O	...

TABLES III., IV., V.—(*cont.*).

	III.		IV.		V.
No. of Plot.	Nodules in Tomato Roots. p=found a=not found.	Nodules in Cucumber Roots. p=found a=not found.	Degree of Infection at End of 1914 Season.	Degree of Infection at End of 1915 Season.	Injurious Effect on Tomatos.
29	a	a	XXX	O	...
31	a	a	X	O	...
34	a	a	X	O	...
41	a	a	XXXX	O	...
45	a	a	X	O	...
46	a	a	X	O	i
2	a	p	XX	X	...
3	a	p	XX	X	...
10	a	p	XX	X	...
15	a	p	XXX	XX	...
19	a	p	XXXX	XXX	...
37	a	p	X	X	i
39	a	p	X	X	...
43	a	p	XX	X	...
14	p	p	XXX	XXX	...
17	p	p	XXX	XXX	i
18	p	p	X	X	...
20	p	p	XXX	XXXX	...
25	p	p	XXX	XXXX	...
27	p	p	XXXX	XXXX	...
32	p	p	XXX	XXX	...
33	p	p	XXX	XXX	...
35	p	p	XXX	XXX	...
36	p	p	X	X	...
42	p	p	XXX	XX	...
44	p	p	XXX	XX	...

In Table III. the plots are sorted out into three groups, of which the first nineteen had no nodules in either crop, the next eight had no nodules in the tomatos but there were nodules in the cucumbers which succeeded them, and the last dozen had nodules in both crops.

Taking the first nineteen and referring to Table IV. it would appear that the results in Plots 4, 5, 7, 23, 24, 29, and 41 are specially good, but 5, 7, 23 were plots on which the plants were abnormal, so that only 4, 24, 29, and 41 are the plots left which were entirely satisfactory. The substances used on these plots were *phenol, potassium cyanide, mercury bichloride*, and *potassium cyanide* respectively.

Plots 6, 21, 22, and 26 are also interesting, for the disease had apparently been exterminated. Plots 21 and 22, however, were treated with substances which produced stunting of the plants. Plots 6 and 26 were dressed with Clubicide and Lysol respectively.

Regarding the rest of the plots, though it was obvious that many of the treatments had had an inhibiting effect (to say the least for them), we decided that it was rather premature to form any definite opinion.

Injurious Effects of Certain Applications on the Tomato Plants.

Kainit.—This substance was applied to Plots 5, 11, and 46. In each case the plants were rather dwarfed (see figs. 14, 15), and the crop of fruit from them was below the average. Though they were specially watered and top dressed they did not respond satisfactorily to the treatment. When the plants were examined at the end of the season it was found that there had been more superficial rooting than in the average and untreated plants. The kainit was applied to Plot 5 at the rate of 6 tons an acre, to Plot 11 at the rate of 3½ tons an acre, whilst Plot 46 got over 4 tons an acre. It is noteworthy that Plot 3 was dressed with sulphate of potash at the rate of 6 tons an acre, and that the plants which grew thereon were indistinguishable from their neighbours which were growing on untreated soil.

Mercury bichloride.—Plots 23 and 29 were treated with this poisonous salt. On the former plot the rate of application was 7¾ cwt. an acre; on the latter plot the rate was 2½ cwt. an acre. The heavier dressing resulted in a stunting of the plants (see fig. 16, Plot 23) as in the kainit plots, but the lighter dressing had no adverse effect (see fig. 17, Plot 29).

Chromic acid.—This substance was applied to Plot 21 at the rate of about 9 cwt. an acre. The plants were slightly dwarfed, and there was slightly more surface-rooting than in ordinary tomato plants.

Potassium bichromate.—Plot 22 was treated with this salt at the rate of 14 cwt. an acre. The plants were slightly dwarfed and there was the same surface-rooting as in the preceding case.

Common salt.—Plot 7 was treated with 3½ tons of common salt an acre. The result was somewhat similar to that of kainit, but not so marked. The plants got extra water and ultimately responded better to the extra care which weak plants received than those growing on kainit (5, 11) and on mercury bichloride (23).

Chlorinated lime.—This substance was applied to two plots. Plot 17 got over 2 tons an acre, Plot 25 got about 25 cwt. Where the heavier dressing was applied the leaves were hardly normal; viewed from a little distance they appeared to be slightly variegated. On closer inspection this peculiarity was by no means so obvious, but seemed to resolve itself into a greater contrast between the vein-tracts and the remainder of the leaf than is ordinarily the case. No perceptible stunting of plants was noticed, but they appeared to be adversely affected, and as chlorinated lime did not in the trial harm the eelworms even as much as it affected the plants it was not tried again in 1916 and 1917.

Season 1916.

During the winter of 1915–16 the same line of treatment was followed. As, however, nineteen of the plots were supposed to be "cured" they were given no further dressings. This reduced the experimental plots to a great extent and necessitated a sub-division of the Creol plot and Plot 18. Eleven new places were found, perhaps due to the stricter search which concluded the experiments of the year 1915.

Nitric acid, potassium permanganate, bleaching powder, chromic acid, potassium bichromate, kainit, caustic soda, soot, and sulphur were not tried in 1916, some because they injured the plants, some because they were unobtainable, and others because they had done no good in 1915.

Six plots were treated with the same substance put on them in 1915, viz.:

TABLE VI.

No. of Plot.	Treatment in 1915.	Quantity applied per acre.	Treatment in 1916.	Quantity applied per acre.
3	Pot. sulphate .	121 cwt.	Pot. sulphate .	86 cwt.
10	Izal . . .	335 gals.	Izal . . .	670 gals.
14	Black carbolic disinfectant	230 ,,	Black carbolic disinfectant	460 ,,
15	Jeyes' Fluid .	242 ,,	Jeyes' Fluid .	517 ,,
19	Lysol . .	312 ,,	Lysol . .	626 ,,
57	Creol . .	261 ,,	Creol . .	1,210 ,,

As *common salt* is a cheap substance and had "cured" its plot in 1915, in spite of the fact that it had retarded the plants in that year, we thought it ought to have another trial. For potassium cyanide and mercury bichloride two of the worst plots were reserved, viz. 20 and 25. Phenol was placed on one of the new places, and liquid carbolic acid on 35, 36, 39, 42, 43, and 44. Carbolic acid had done well on Plots 4 and 31 in the preceding year, was specially recommended by the Board of Agriculture, and was easily obtainable, so we thought it ought to have a more extensive trial. Mixed with sawdust it was placed on Plot 61 also, and worked into the subsoil like vaporite. Later on, this plot was soaked with water. The list of plots treated in 1916 with liquid carbolic acid and with phenol are given in Table VII., together with the applications tried on the same places in 1915.

TABLE VII.

Plot.	Treatment 1915.	Treatment 1916.	Quantity per acre.
35	"V.N."	Liq. carbolic acid	333 gals.
36	Vaporite	,, ,,	333 ,,
39	Black carbolic disinfectant	,, ,,	333 ,,
42	Jeyes' Fluid	,, ,,	465 ,,
43	Izal	,, ,,	242 ,,
44	Clubicide	,, ,,	385 ,,
61	—	,, ,,	1,089 ,,
47	—	Phenol	29 cwt.

Liquid carbolic acid or cresylic acid was a new substance in these trials and a little variation in quantity was made.

Creosote, saponified creosote, paraffin emulsion, and turpentine emulsion, naphthalene, iodine, and copper sulphate were allocated to other plots, whilst mercury bichloride was put in small quantities on a more lightly infected place.

This is all shown in Table VIII.

TABLE VIII.—SUBSTANCES USED ON PLOTS IN SEASON 1916, WITH QUANTITIES AND COST PER ACRE.

	Plot.	Substance applied.	Quantity per Acre.	Dilution.	Price for Calculation.	Cost per Acre.
						£
3	54	Iodine . . .	2·28 cwt.	1/1000	—	—
4	3	Potassium sulphate	86·5 ,,	1/14	£14 per ton	60
	17	Common salt .	44·5 ,,	1/25	2s. 6d. per cwt.	6
	37	Copper sulphate .	24 ,,	2/100	£50 ,,	60
	56	,, .	35 ,,	3/100	£50 ,,	88
	25	Mercury bichloride	3·25 ,,	1/500	3s. per lb.	61
	52	,,	1·62 ,,	1/1000	3s. ,,	28
	20	Potassium cyanide	16·5 ,,	1/150	1s. ,,	93
5	47	Phenol . . .	29 ,,	2/100	1s. ,,	162
	35, 36	Cresylic acid . .	333 gal.	1/80	3s. per gal.	50
	39	,, . .	242 ,,	1/80	3s. ,,	36
	42	,, . .	242 ,,	1/80	3s. ,,	36
	43	,, . .	242 ,,	1/80	3s. ,,	36
	44	,, . .	484 ,,	1/80	3s. ,,	73
	61	,, . .	1089 ,,	pure	3s. ,,	164
	48	Creosote . .	640 ,,	,,	1s. ,,	32
	49	,, . .	640 ,,	,,	1s. ,,	32
	2	Creosote emulsion (equal to "Soluble Creosote")	*487 ,, (650 gals.)	2·5 % Creosote	1s. ,,	24 (32)
	51	Paraffin emulsion	*730 ,,	5/100	7d. ,,	21
	55	,,	*1090 ,,	5/100	7d. ,,	32
	50	Turpentine emulsion	*437 ,,	5/100	—	—
6	14	Black carbolic disinfectant	460 ,,	1/40	—	46
	10	Izal . . .	670 ,,	1/25		67
	15	Jeyes' Fluid . .	517 ,,	1/40		52
	19	Lysol . . .	626 ,,	1/25	say 2s. per gal.	63
	57	Creol . . .	1210 ,,	1/20		121
	32	Clubicide . .	428 ,,	1/40		43
	58a	Carbosol . .	177 ,,	1/32		18
	58b	,, . .	352 ,,	—		35
7	60	"V.C." . . .	112 cwt.	dry		
	59	"V.N." . . .	112 ,,	,,		
	27	Vaporite . .	69 ,,	,,	£10 per ton	34
	53	Naphthalene . .	17 ,,	,,	16s. per cwt.	14

* These figures represent the *pure* creosote, paraffin, and turpentine before emulsification.

We can examine first of all the plots which were supposed to have been cured in 1915.

TABLE IX.

Substance put on in Jan. 1915.	Plot.	Infection at end of 1914.	Infection at end of 1915.	Infection at end of 1916.	
Nitric acid . . .	1	X	O	O	*
Phenol	4	XXXX	O	Tr	*
Kainit	5	XXXX	O	XXX	—
Clubicide . . .	6	XX	O	XX	—
Common salt . .	7	XXX	O	X	—
Potassium permanganate	8	X	O	O	*
Copper sulphate . .	9	X	O	Tr	—
Kainit	11	X	O	O	—
Chromic acid . .	21	XX	O	O	*
Potassium bichromate .	22	XX	O	O	*
Mercury bichloride .	23	XXXX	O	O	*
Potassium cyanide . .	24	XXX	O	O	*
Lysol	26	XX	O	XX	—
Mercury bichloride .	29	XXX	O	O	*
Phenol	31	X	O	O	*
"V.C." . . .	34	X	O	X	—
Potassium cyanide . .	41	XXXX	O	Tr	—
Carbosol	45	X	O	Tr	—
Kainit and caustic soda	46	X	O	O	*

An examination of this table shows that the effects of kainit, Clubicide, common salt, Lysol, and "V.C." were not permanent. Those whose effects had lasted for two seasons are starred in the last column. It may be here remarked that the stunting effect in Plots 5, 11, and 23 were still visible in 1916, though in a less degree than in the previous year.

The majority of these substances had, however, been tried again, and the results are given in the next table for comparison with those of Table IX.

TABLE X.

Substance.	Plot.	Infection at end of 1915.	Infection at end of 1916.
Phenol	47*a*	XX	O
,, ...	47*b*	XX	X
,, ...	47*c*	XX	O
,, ...	47*d*	XX	O
Clubicide	32	XXX	Tr
Common salt . . .	17	XXX	X
Copper sulphate . .	37	X	XX
,, . .	56	XX	XXX
Mercury bichloride . .	25	XXXX	Tr
,, . . .	52	X	Tr
Potassium cyanide . .	20*a*	XXXX	X
,, . . .	20*b*	XXXX	O
,, . . .	20*c*	XXXX	O
Lysol	19	XXX	XXX
"V.C."	60	XXX	XX
Carbosol	58*a*	XXXX	XX
,, ...	58*b*	XXXX	XXX

Copper sulphate here shows up in a very disappointing manner. Though Lysol and Carbosol had been put on at double the strength of the previous year they failed to get the upper hand as mercury bichloride, potassium cyanide, and phenol did. Common salt did not quite eliminate the worms, though apparently it is harmful to them.

Turning next to the plots which were treated, for two years running, with the same substance the results are as follows:

TABLE XI.

Plot.	Substance applied.	Infection at end of 1915.	Infection at end of 1916.
3	Potassium sulphate .	X	XX
10	Izal	X	O
14	Black Carbolic Disinfectant	XXX	X
15	Jeyes' Fluid . . .	XX	O
19	Lysol	XXX	XXX
57	Creol	XXX	XX

The Lysol result is rather anomalous, and potassium sulphate is not so effective as kainit has shown itself to be, nor yet as good as common salt. Creol lowered the infection, and Izal and Jeyes' Fluid did very well.

The results of the carbolic group of plots are given in the next table, No. XII., and from it one would conclude that the quantity was too small. Better results were certainly expected, for cresylic acid is said to be more powerful than carbolic acid as a germicide, and 242 gallons, 333 gallons, 465 gallons, and 1,089 gallons weigh about 1 ton, $1\frac{1}{2}$ tons, 2 tons, and 5 tons respectively. As phenol at 29 cwt. and 34 cwt. does well, and even at 15 cwt. an acre, these large quantities of cresylic acid ought to have done better. The latter acid does not appear to be as powerful a vermicide as phenol, whatever it may be as a bactericide.

TABLE XII.

Plot.	Application.	Quantity applied to the acre.	Degree of Infection at end of 1915.	Degree of Infection at end of 1916.
35	Cresylic acid . .	333 gals.	XXX	XXX
36	,, . .	333 ,,	X	Tr
39	,, . .	333 ,,	X	X
42	,, . .	465 ,,	XX	X
43	,, . .	242 ,,	X	X
44	,, . .	385 ,,	XX	XX
61	,, . .	1089 ,,	X	O
47a	Phenol	29 cwt.	XX	O
47b	,, ...	29 ,,	XX	X
47c	,, ...	29 ,,	XX	O
47d	,, ...	29 ,,	XX	O

The results for "powder substances," viz. "V.N.," "V.C.," vaporite, and naphthalene may next be considered.

TABLE XIII.

Quantity Applied.	Substance.	Plot.	Degree of Infection in 1916.	
			Jan.	Oct.
69 cwt.	Vaporite . . .	27	XXXX	XXXX
17 ,,	Naphthalene . .	53	X	XX
112 ,,	"V.N." . . .	59	XXXX	XXXX
112 ,,	"V.C." . . .	60	XXX	XX

It appears that "V.C." was the best application of this group.

Results were obtained for the first time in these experiments with the following five substances:

TABLE XIV.

Substance Applied.	Plot.	Degree of Infection Season 1916.		Quantity per acre.
		Jan.	Oct.	
Iodine . .	54	XX	XX	$2\frac{1}{4}$ cwt.
Turpentine .	50	X	XX	437 gals.
Paraffin . .	55	XX	XXX	1090 ,,
,, . .	51	XX	XXX	730 ,,
Creosote . .	48	X	XXX	640 ,,
,, . .	49	XX	XX	640 ,,
Creosote emulsion	2	X	O	487 ,,

The iodine was dissolved in alcohol and the solution was diluted with water and watered into the subsoil. The turpentine and paraffin were emulsified with soap and applied to the plots. The quantities given represent the actual amounts of pure turpentine and paraffin used, not the volumes of the stock emulsions made from them. The creosote in Plots 48 and 49 was applied as a coarse spray, and after application the treated subsoil certainly appeared to be a "poison-stratum." No water was applied. In Plot 2 the number 487 gallons represents pure creosote. It was emulsified with soap at the rate of 1 lb. of soap to 1 quart of creosote. The creosote emulsion was the only one of the group which did any good, and it was deemed advisable to use a "home-made" creosote emulsion in 1917 on a larger scale.

After examining the results of the two years' trials it was decided that potassium cyanide, mercury bichloride, and phenol, in the order given, were the most efficacious vermicides that had been used; that cresylic acid and creosote emulsion appeared to be on the right lines also, and if applied in greater quantities the results were likely to be attended with success.

Season 1917.

In commencing the 1917 season's experiments we decided to put down plots on a larger scale and make the attempt to exterminate the disease throughout the nursery. Three houses were treated with mercury chloride solution wherever disease remained, one house with sodium cyanide (for potassium cyanide was not procurable), four houses with liquid carbolic acid, two with creosote emulsion, one with a liquid, called Twiset, which had been kindly presented to us, and one with pyridine. Of the vermicidal power of the last two we knew nothing.

Table XV.—Substances Used on Plots in Season 1917, with Quantities and Costs per Acre.

	Plots.	Substance Applied.	Quantity per acre.	Dilution.	Price.	Cost per acre.
						£
4	73, 74	Mercury bichloride	1·2 cwt.	1/500	3*s.* per lb.	20
	63, 64	,,	3 ,,	1/500	3*s.* ,,	50
	25, 26, 27, 28	,,	3 ,,	1/500	3*s.* ,,	50
	53, 66, 72, 55, 65, 20, 19, 54, 71, 56, 67	Sodium cyanide	24 ,,	1/150	1*s.* per lb.	135
5	62	Cresylic acid	427 gal.	1/80	3*s.* per gall.	64
	47*b*	,,	415 ,,	1/80	3*s.* ,,	62
	34, 35, 36, 37, 42, 43, 41, 39	,,	465 ,,	1/80	3*s.* ,,	70
	44, 45	,,	385 ,,	1/80	3*s.* ,,	58
	32, 69, 68, 70	Creosote emulsion	870 ,,	1/45	1*s.* ,,	43
	57, 58*a*, 58*b*, 59, 60	,,	700 ,,	1/45	1*s.* ,,	35
	17, 51, 14	Pyridine	16 cwt.	1/100	2*s.* 6*d.* ,,	20
	50, 48, 9, 7, 6, 5, 3, 4	Twiset	165 gal.	1/100	—	—

All plots which were supposed to be cured were left untreated. Of these certain plots had shown no disease since the first treatment, their history being epitomized in Table XVI.

Table XVI.

Plot.	Application.	1915.	1916.	1917.
1	Nitric acid	X	O	O
8	Potassium permanganate	X	O	O
11	Kainit	X	O	O
21	Chromic acid	XX	O	O
22	Potassium bichromate	XX	O	O
23	Mercury bichloride	XXXX	O	O
24	Potassium cyanide	XXX	O	O
29	Mercury bichloride	XXX	O	O
31	Phenol	X	O	O
46	Kainit and caustic soda	X	O	O

The others were "cures" of one year's standing, as shown in Table XVII.

TABLE XVII.

Plot.	1916.	Treatment.	1917.
2	X	Creosote emulsion	O
10	X	Izal	O
15	XX	Jeyes' Fluid	O
20*b*	XXXX	Potassium cyanide	O
20*c*	XXXX	,,	O
47*a*	XX	Phenol	O
47*c*	XX	,,	O
47*d*	XX	,,	O
61	X	Cresylic acid	O

From the experimental point of view it was an error to put on so much sodium cyanide in House 3, but it had been for many years a troublesome house, and we had found in digging out the roots that the tiny rootlets penetrated the walls on each side of the beds and that some of our difficulties were due to the infection residing in the crevices of the walls. In the previous two years the walls had always got what we considered to be their share of the solutions, but it is difficult to soak a vertical face. It was almost an impossibility to sterilize the walls, and half of the solution was utilized in trying to get them well soaked. Our previous results had shown that 8 or 10 cwt. an acre would have sufficed for the subsoil. However, 24 cwt. an acre was the quantity we used. The stock creosote emulsion used consisted of creosote, soap and water, the creosote representing exactly half the volume of the stock emulsion.

The results for the year are given in the following tables:

TABLE XVIII.—PLOTS TREATED WITH SODIUM CYANIDE.

Plot.	Infection.	
	Jan. 1917.	Oct. 1917.
53	XX	O
66	X	O
72	X	O
55	XXX	O
65	X	O
20*a*	X	O
19	XXX	O
54	XX	O
71	X	O
56	XXX	O
67	XX	O

The results for sodium cyanide are shown to be very satisfactory.

TABLE XIX.—PLOTS TREATED WITH MERCURY BICHLORIDE.

Plot.	Infection Jan. 1917.	Infection Oct. 1917.	Substance Applied.	
			Quantity.	Dilution.
73	X	O	1·2 cwt.	1/500
74	X	O	1·2 ,,	1/500
63	XX	O	3 ,,	1/500
64	XX	O	3 ,,	1/500
25	Tr	O	3 ,,	1/500
26	XX	Tr	3 ,,	1/500
27	XXXX	X	3 ,,	1/500
28	XX	O	3 ,,	1/500
52	Tr	Tr	3 ,,	1/500

In Plot 26 two small nodules were found on one plant; in Plot 27, instead of the plants being full of large brown nodules, an aggregate of about two dozen pin-head nodules were found on half a dozen plants. The result is very good indeed, disappointing only in the nearness to a perfect result and yet just missing it.

TABLE XX.—PLOTS TREATED WITH CRESYLIC ACID.

Plot.	Infection.		Substance Applied.	
	Jan. 1917.	Oct. 1917.	Quantity per acre.	Dilution.
62	X	O	427 gals.	1/80
47*b*	X	O	415 ,,	1/80
34	X	O	465 ,,	1/80
35	XXX	XX		1/80
36	Tr	X		1/80
37	XX	Tr		1/80
42	X	X		1/80
43	X	Tr		1/80
41	Tr	O		1/80
39	X	O		1/80
44	X	O	385 ,,	1/80
45	Tr	O	385 ,,	1/80

In this group of plots the success was by no means so marked as in the two previous groups. That cresylic acid is a treatment on the right lines is, however, apparent, but the quantity applied must be greater to get a result.

From Tables 21, 22, and 23 it is evident that creosote emulsion did not come up to expectations, and that pyridine and Twiset did no good whatever when applied in this way.

Fig. 16.—Stunting Effect of $7\frac{3}{4}$ cwt. Mercuric Chloride to the Acre.
(*a a*) Level of stunted plants. (*b b*) Level of average plants. [*To face p.* 48.

FIG. 17.—Between the two upright bamboos is a length of 15 feet of bed treated with mercuric bichloride $2\frac{1}{2}$ cwt. to the acre. No stunting of plants is apparent.

[To face p. 49.

TABLE XXI.—PLOTS TREATED WITH CREOSOTE EMULSION.

Plot.	Infection 1917.		Quantity of Creosote Emulsion applied per acre.	Dilution.
	Jan.	Oct.		
32	Tr	X		1/45
69	X	X	870 gals.	1/45
68	X	X	870 gals.	1/45
70	X	O	870 gals.	1/45
57	XX	XXXX	870 gals.	1/45
58*a*	XX	XXX	870 gals.	1/45
58*b*	XXX	XXX	870 gals.	1/45
59	XXXX	XXXX	870 gals.	1/45
60	XX	XXX	700 ,,	1/45

TABLE XXII.—PLOTS TREATED WITH PYRIDINE.

Plot.	Infection 1917.		Pyridine applied per acre.	Dilution.
	Jan.	Oct.		
17	X	X	16 cwt.	1/100
51	XXX	XXX	16 ,,	1/100
14	X	XXX	16 ,,	1/100

TABLE XXIII.—PLOTS TREATED WITH "TWISET."

Plot.	Infection 1917.		Twiset applied. per acre.	Dilution.
	Jan.	Oct.		
50	XX	XX	165 gals.	1/100
9	Tr	X	165 ,,	1/100
48	XXX	XXX	165 ,,	1/100
7	X	XXX	165 ,,	1/100
6	XX	XXXX	165 ,,	1/100
5	XXX	XXXX	165 ,,	1/100
3	XX	XXX	165 ,,	1/100
4	Tr	Tr	165 ,,	1/100

Any record of these experiments would be incomplete if I did not say a few words about the attitude of the grower, Mr. COUSINS, relative to the work which has now gone on for three seasons. I met him for the first time in the autumn of 1914, when the inquiry respecting eelworm eradication was made. The information available was satisfactory neither to giver nor receiver: sulphate of potash and naphthalene were then at a premium or unobtainable because of war conditions, gas lime was likewise unobtainable, and the use of carbolic acid would entail a cost of £1,000 an acre. If the latter was "the cure" it might well be said that the cure was worse than the disease. However, he gave me a "free hand" in dealing with the matter so long as the growth of his crops was not interfered with. The work in a measure impeded him in the winter preparation, called for considerable sacrifice of time at the end of the season, and throughout entailed attention to details which would have been irksome to many people. He remained imperturbable. Long practice had enabled him to detect small abnormalities in the growth of tomato plants, and any such abnormalities he carefully recorded. He was as much interested in the plots as I was myself. Had such not been the case, the results which have been gleaned would probably have been in part lost. As a student of Plant Pathology I am deeply indebted to Mr. Cousins for his hearty co-operation in this "Field" Experiment. It is only when an inquirer adopts the helpful attitude above described that one gets a *chance* of accumulating information—and Agricultural Biology is after all only a young science; its store of facts is but scanty.

My hearty thanks are also due to my colleague, Mr. G. S. Robertson, M.Sc., for the kind help he has given me in these experiments.

Conclusions.

From these Field Experiments the following are some of the conclusions at which we have arrived:

1. That both cyanide of sodium and cyanide of potassium applied to the subsoil in quantities of half a ton an acre will free the subsoil from eelworms present therein, at a cost of about £50.

2. That mercury chloride at the rate of 3 cwt. an acre will do likewise, at a cost of about £50.

3. That phenol has vermicidal powers, but that the quantities which must be applied make the treatment more costly than either of the first two substances.

4. That cresylic acid has vermicidal powers also, but that its use will entail greater expense than (1) or (2) without the certainty of completely exterminating the worms.

5. That creosote applied pure is useless, and that saponified creosotes tend to check eelworm disease.

6. That the proprietary substances on the market if applied to subsoils in the small quantities given in the "Directions for Use" are not likely to give satisfaction to tomato-growers, but that in larger quantities they check the progress of the disease.

7. That naphthalene and naphthalene compounds are not inhibitory.

8. That sulphur, iodine, and chlorine as generated from chlorinated lime are of no use.

9. That kainit, salt, chromic acid, and potassium bichromate are deleterious both to eelworms and tomatos.

10. That an alkaline substance like caustic soda does not in any way check the disease.

11. That nitric acid (as representing mineral acids) is on the right lines but very costly.

12. That copper sulphate has no appreciable adverse effect on tomato eelworms in soil.

13. That poisonous substances like sodium cyanide, mercury chloride, and copper sulphate may be introduced into the subsoil in certain quantities without endangering the growing crop.

TABLE XXIV.—SHOWING THE HISTORY OF EACH PLOT FROM 1915 TO THE END OF 1917.

Plot.	Degree of Infection at end of Season 1914 and beginning of 1915.	Treatment Season 1915.		Degree of Infection in Winter 1915-16.	Treatment Season 1916.		Degree of Infection in Winter 1916-17.	Treatment Season 1917.		Degree of Infection in Winter 1917-18.
1	X	Nitric acid . .	138 c.	O	Nothing . . .	—	O	Nothing . . .	—	X
2	XX	Nitric acid . .	69 c.	X	Creosote emulsion .	487 g.	O	Nothing . . .	—	XX
3	XX	Potassium sulphate .	121 c.	X	Potassium sulphate .	86 c.	XX	Twiset . . .	165 g.	XXX
4	XXXX	Phenol . . .	42 c.	O	Nothing . . .	—	Tr	Twiset . . .	165 g.	Tr
5	XXXX	Kainit . . .	121 c.	O	Nothing . . .	—	XXX	Twiset . . .	165 g.	XXXX
6	XX	Clubicide . . .	39 c.	O	Nothing . . .	—	XX	Twiset . . .	165 g.	XXXX
7	XXX	Common salt . .	69 c.	O	Nothing . . .	—	X	Twiset . . .	165 g.	XXX
8	X	Pot. permanganate .	26 c.	O	Nothing . . .	—	O	Nothing . . .	—	X
9	X	Copper sulphate .	34 c.	O	Nothing . . .	—	Tr	Twiset . . .	165 g.	X
10	XX	Izal	335 g.	X	Izal . . .	670 g.	O	Nothing . . .	—	XX
11	X	Kainit . . .	68 c.	O	Nothing . . .	—	O	Nothing . . .	—	O
14	XXX	Black carbolic disinfectant	230 g.	XXX	Black carbolic disinfectant	460 g.	X	Pyridine . . .	16 c.	XXX
15	XXX	Jeyes' Fluid . .	242 g.	XX	Jeyes' Fluid . .	517 g.	O	Nothing . . .	—	XXX
17	XXX	Chlorinated lime .	44 c.	XXX	Common salt . .	44 c.	X	Pyridine . . .	16 c.	X
19	XXXX	Lysol . . .	312 g.	XXX	Lysol . . .	626 g.	XXX	Sodium cyanide .	24 c.	O
20a	XXX	Caustic soda .	16 c.	XXXX	Potassium cyanide .	16 c.	X	Sodium cyanide .	24 c.	O
20b	XXX	Caustic soda . .	16 c.	XXXX	Potassium cyanide .	16 c.	O	Nothing . . .	—	O
20c	XXX	Caustic soda . .	16 c.	XXXX	Potassium cyanide .	16 c.	O	Nothing . . .	—	O
21	XX	Chromic acid . .	10 c.	O	Nothing . . .	—	O	Nothing . . .	—	O
22	XX	Potassium bichromate	14 c.	O	Nothing . . .	—	O	Nothing . . .	—	O
23	XXXX	Mercury bichloride .	8 c.	O	Nothing . . .	—	O	Nothing . . .	—	O
24	XXX	Potassium cyanide .	10 c.	O	Nothing . . .	—	O	Nothing . . .	—	O
25	XXX	Soot	—	XXXX	Mercury bichloride .	3 c.	Tr	Mercury bichloride .	3 c.	Tr
26	XX	Lysol	182 g.	O	Nothing . . .	—	XX	Mercury bichloride .	3 c.	Tr
27	XXXX	Sulphur . . .	30 c.	XXXX	Vaporite . . .	69 c.	XXXX	Mercury bichloride .	3 c.	X

29	XXX	Mercury bichloride	$2\frac{1}{2}$ c.	O	Nothing	—	O	Nothing	—	O
31	X	Phenol	$15\frac{1}{2}$ c.	O	Nothing	—	O	Nothing	—	X
32	XXX	Evans' Soil Sterilizer	52 g.	XXX	Clubicide	428 g.	Tr	Creosote emulsion	870 g.	X
34	X	"V.C."	53 c.	O	Nothing	—	X	Cresylic acid	465 g.	O
35	XXX	"V.N."	56 c.	XXX	Cresylic acid	333 g.	XXX	Cresylic acid	465 g.	XX
36	X	Vaporite	15 c.	X	Cresylic acid	333 g.	Tr	Cresylic acid	465 g.	X
37	X	Chlorinated lime	25 c.	X	Copper sulphate	24 c.	XX	Cresylic acid	465 g.	Tr
39	X	Black carbolic disinfectant	128 g.	X	Cresylic acid	242 g.	X	Cresylic acid	465 g.	O
41	XXXX	Potassium cyanide	9 c.	O	Nothing	—	Tr	Cresylic acid	465 g.	O
42	XXX	Jeyes' Fluid	121 g.	XX	Cresylic acid	242 g.	X	Cresylic acid	465 g.	X
43	XX	Izal	121 g.	X	Cresylic acid	242 g.	X	Cresylic acid	465 g.	Tr
44	XXX	Clubicide	115 g.	XX	Cresylic acid	484 g.	X	Cresylic acid	465 g.	O
45	X	Carbosol	115 g.	O	Nothing	—	Tr	Cresylic acid	465 g.	O
46	X	Caustic soda and kainit	12 c. 86 c.	O	Nothing	—	O	Nothing	—	X
47a	—	—	—	XX	Phenol	29 c.	O	Nothing	—	O
47b	—	—	—	XX	Phenol	29 c.	X	Cresylic acid	415 g.	O
47c	—	—	—	XX	Phenol	29 c.	O	Nothing	—	O
47d	—	—	—	XX	Phenol	29 c.	O	Nothing	—	O
48	—	—	—	X	Creosote	640 g.	XXX	Twiset	165 g.	XXX
49	—	—	—	XX	Creosote	640 g.	XX	Creosote emulsion	870 g.	XXX
50	—	—	—	X	Turpentine emulsion	437 g	XX	Twiset	165 g.	XX
51	—	—	—	XX	Paraffin emulsion	730 g.	XXX	Pyridine	16 c.	XXX
52	—	—	—	X	Mercury bichloride	$1\frac{1}{2}$ c.	Tr	Mercury bichloride	3 c.	Tr
53	—	Pot. permanganate	3 c.	X	Naphthalene	17 c.	XX	Sodium cyanide	24 c.	O
54	—	—	—	XX	Iodine	2 c.	XX	Sodium cyanide	24 c.	O
55	—	Pot. permanganate	3 c.	XX	Paraffin emulsion	1090 g	XXX	Sodium cyanide	24 c.	O
56	—	—	—	XX	Copper sulphate	35 c.	XXX	Sodium cyanide	24 c.	O
57	XXX	Creol	261 g.	XXX	Creol	1210 g.	XX	Creosote emulsion	870 g.	XXXX
58a	XXXX	Creol	261 g.	XXXX	Carbosol	177 g.	XX	Creosote emulsion	870 g.	XXX
58b	XXXX	Creol	261 g.	XXXX	Carbosol	352 g.	XXX	Creosote emulsion	870 g.	XXX
59	XXX	Creol	261 g.	XXX	"V.N."	112 c.	XXXX	Creosote emulsion	870 g.	XXXX
60	XXX	Creol	261 g.	XXX	"V.C."	112 c.	XX	Creosote emulsion	700 g.	XXX
61	—	—	—	X	Cresylic acid in sawdust	1089 g.	O	Nothing	—	Tr
62	—	—	—	—	—	—	X	Cresylic acid	427 g.	O

TABLE XXIV.—(*cont.*)

Plot.	Degree of Infection at end of Season 1914 and beginning of 1915.	Treatment Season 1915.		Degree of Infection in Winter 1915-16.	Treatment Season 1916.		Degree of Infection in Winter 1916-17.	Treatment Season 1917.		Degree of Infection in Winter 1917-18.
63	—	—	—	—	—	—	XX	Mercury bichloride .	3 c.	O
64	—	—	—	—	—	—	XX	Mercury bichloride .	3 c.	O
65	—	—	—	—	—	—	X	Sodium cyanide .	24 c.	O
66	—	—	—	—	—	—	X	Sodium cyanide .	24 c.	O
67	—	—	—	—	—	—	XX	Sodium cyanide .	24 c.	O
68	—	—	—	—	—	—	X	Creosote emulsion .	870 g.	X
69	—	—	—	—	—	—	X	Creosote emulsion .	870 g.	X
70	—	—	—	—	—	—	X	Creosote emulsion .	870 g.	O
71	—	—	—	—	—	—	X	Sodium cyanide .	24 c.	O
72	—	—	—	—	—	—	X	Sodium cyanide .	24 c.	O
73	—	—	—	—	—	—	X	Mercury bichloride .	$1\frac{1}{4}$ c.	O
74	—	—	—	—	—	—	X	Mercury bichloride .	$1\frac{1}{4}$ c.	O

SUMMARY OF RESULTS.*

Diseased Subsoils treated with Mineral Acids.

Nitric Acid.

Year.	Plot 1. Rate 138 cwt. per acre.		
	Before.		After.
1915	X	⟶	O
1916	O	Nothing applied	O
1917	O	Nothing applied	X

Year.	Plot 2. Rate 69 cwt. per acre.		
	Before.		After.
1915	XX	⟶	X
1916	X	Creosote emulsion	O
1917	O	Nothing	XX

Chromic Acid.

Year.	Plot 21. Rate 10 cwt. per acre.		
	Before.		After.
1915	XX	⟶	O
1916	O	Nothing applied	O
1917	O	Nothing applied	O

Diseased Subsoils treated with Alkalies.

Caustic Soda.

Year.	Plot 20*a*. Rate 16 cwt. per acre.		
	Before.		After.
1915	XXX	⟶	XXXX
1916	XXXX	Pot. cyanide	X
1917	X	Sod. cyanide	O

Year.	Plot 20*b*. Rate 16 cwt. per acre.		
	Before.		After.
1915	XXX	⟶	XXXX
1916	XXXX	Pot. cyanide	O
1917	O	Nothing	O

Year.	Plot 20*c*. Rate 16 cwt. per acre.		
	Before.		After.
1915	XXX	⟶	XXXX
1916	XXXX	Pot. cyanide	O
1917	O	Nothing	O

Diseased Subsoils treated with Mineral Salts.

Potassium Cyanide.

Year.	Plot 24. Rate 10 cwt. per acre.		
	Before.		After.
1915	XX	⟶	O
1916	O	Nothing	O
1917	O	Nothing	O

Year.	Plot 41. Rate 9 cwt. per acre.		
	Before.		After.
1915	XXXX	⟶	O
1916	O	Nothing	Tr
1917	Tr	Cresylic acid	O

* In these summaries the arrow indicates the year in which the substance under review was tried, and the results of that year only are significant.

Potassium Cyanide—(cont.).

Year.	Plot 20*a*. Rate 16 cwt. per acre.		
	Before.		After.
1915	XXX	Caustic soda	XXXX
1916	XXXX	⟶	X
1917	X	Sod. cyanide	O

Year.	Plot 20*b*. Rate 16 cwt. per acre.		
	Before.		After.
1915	XXX	Caustic soda	XXXX
1916	XXXX	⟶	O
1917	O	Nothing	O

Year.	Plot 20*c*. Rate 16 cwt. per acre.		
	Before.		After.
1915	XXX	Caustic soda	XXXX
1916	XXXX	⟶	O
1917	O	Nothing	O

Sodium Cyanide.

Year.	Plot 19. Rate 24 cwt. per acre.		
	Before.		After.
1915	XXXX	Lysol	XXX
1916	XXX	Lysol	XXX
1917	XXX	⟶	O

Year.	Plot 54. Rate 24 cwt. per acre.		
	Before.		After.
1915	—	Nothing	XX
1916	XX	Iodine	XX
1917	XX	⟶	O

Year.	Plot 20*a*. Rate 24 cwt. per acre.		
	Before.		After.
1915	XXX	Caustic soda	XXXX
1916	XXXX	Pot. cyanide	X
1917	X	⟶	O

Year.	Plot 65. Rate 24 cwt. per acre.		
	Before.		After.
1915	—	—	—
1916	—	Nothing	X
1917	X	⟶	O

Year.	Plot 55. Rate 24 cwt. per acre.		
	Before.		After.
1915	—	Nothing	XX
1916	XX	Paraffin emul.	XXX
1917	XXX	⟶	O

Year.	Plot 67. Rate 24 cwt. per acre.		
	Before.		After.
1915	—	Nothing	—
1916	—	Nothing	XX
1917	XX	⟶	O

Year.	Plot 72. Rate 24 cwt. per acre.		
	Before.		After.
1915	—	Nothing	—
1916	—	Nothing	X
1917	X	⟶	O

Year.	Plot 66. Rate 24 cwt. per acre.		
	Before.		After.
1915	—	—	—
1916	—	Nothing	X
1917	X	⟶	O

Sodium Cyanide—(cont.).

Year.	Plot 71. Rate 24 cwt. per acre.		
	Before.		After.
1915	—	Nothing	—
1916	—	Nothing	X
1917	X	⟶	O

Year.	Plot 53. Rate 24 cwt. per acre.		
	Before.		After.
1915	—	$KMnO_4$	X
1916	X	Naphthalene	XX
1917	XX	⟶	O

Year.	Plot 56. Rate 24 cwt. per acre.		
	Before.		After.
1915	—	Nothing	XX
1916	XX	Copper sulphate	XXX
1917	XXX	⟶	O

Mercury Bichloride, $HgCl_2$.

Year.	Plot 23. Rate 8 cwt. per acre.		
	Before.		After.
1915	XXXX	⟶	O
1916	O	Nothing	O
1917	O	Nothing	O

Year.	Plot 29. Rate 2½ cwt. per acre.		
	Before.		After.
1915	XXX	⟶	O
1916	O	Nothing	O
1917	O	Nothing	O

Year.	Plot 26. Rate 3 cwt. per acre.		
	Before.		After.
1915	XX	Lysol	O
1916	O	Nothing	XX
1917	XX	⟶	Tr

Year.	Plot 52. Rate 1½ cwt. per acre.		
	Before.		After.
1915	—	Nothing	X
1916	X	⟶	Tr
1917	Tr	—	Tr

Year.	Plot 73. Rate 1½ cwt. per acre.		
	Before.		After.
1915	—	Nothing	—
1916	—	Nothing	X
1917	X	⟶	O

Year.	Plot 74. Rate 1½ cwt. per acre.		
	Before.		After.
1915	—	Nothing	—
1916	—	Nothing	X
1917	X	⟶	O

Year.	Plot 63. Rate 3 cwt. per acre.		
	Before.		After.
1915	—	—	—
1916	—	Nothing	XX
1917	XX	⟶	O

Year.	Plot 64. Rate 3 cwt. per acre.		
	Before.		After.
1915	—	—	—
1916	—	Nothing	XX
1917	XX	⟶	O

Mercury Bichloride, $HgCl_2$—(cont.).

Year.	Plot 25. Rate 3 cwt. per acre.		
	Before.		After.
1915	XXX	Soot	XXXX
1916	XXXX	→	Tr
1917		Repeated	

Year.	Plot 52. Rate 3 cwt. per acre.		
	Before.		After.
1915	—	Nothing	X
1916	X	Mercury bichloride	Tr
1917	Tr	→	Tr

Year.	Plot 27. Rate 3 cwt. per acre.		
	Before.		After.
1915	XXXX	Sulphur	XXXX
1916	XXXX	Vaporite	XXXX
1917	XXXX	→	X

Year.	Plot 25. Rate 3 cwt. per acre.		
	Before.		After.
1915	XXX		XXXX
1916	XXXX	$HgCl_2$	Tr
1917	Tr	→	Tr

Kainit.

Year.	Plot 11. Rate 68 cwt. per acre.		
	Before.		After.
1915	X	→	O
1916	O	Nothing	O
1917	O	Nothing	O

Year.	Plot 5. Rate 121 cwt. per acre.		
	Before.		After.
1915	XXXX	→	O
1916	O	Nothing	XXX
1917	XXX	Twiset	XXXX

Year.	Plot 46. Rate 86 cwt. per acre.		
	Before.		After.
1915	X	→	O
1916	O	Nothing	O
1917	O	Nothing	X

Potassium Sulphate.

Year.	Plot 3. Rate 121 cwt. per acre.		
	Before.		After.
1915	XX	→	X
1916	X	K_2SO_4	XX
1917	XX	Twiset	XXX

Year.	Plot 3. Rate 86 cwt. per acre.		
	Before.		After.
1915	XX	K_2SO_4	X
1916	X	→	XX
1917	XX	Twiset	XXX

Common Salt, NaCl.

Year.	Plot 17. Rate 44 cwt. per acre.		
	Before.		After.
1915	XXX	Chlorinated lime	XXX
1916	XXX	→	X
1917	X	Pyridine	X

Year.	Plot 7. Rate 69 cwt. per acre.		
	Before.		After.
1915	XXX	→	O
1916	O	Nothing	X
1917	X	Twiset	XXX

Chlorinated Lime.

Year.	Plot 17. Rate 44 cwt. per acre.		
	Before.		After.
1915	XXX	⟶	XXX
1916	XXX	Common salt	X
1917	X	Pyridine	X

Year.	Plot 37. Rate 25 cwt. per acre.		
	Before.		After.
1915	X	⟶	X
1916	X	Copper sulphate	XX
1917	XX	Cresylic acid	Tr

Copper Sulphate.

Year.	Plot 9. Rate 34 cwt. per acre.		
	Before.		After.
1915	X	⟶	O
1916	O	Nothing	Tr
1917	Tr	Twiset	X

Year.	Plot 56. Rate 35 cwt. per acre.		
	Before.		After.
1915	—	Nothing	XX
1916	XX	⟶	XXX
1917	XXX	NaCN	O

Year.	Plot 37. Rate 24 cwt. per acre.		
	Before.		After.
1915	X	Chlorinated lime	X
1916	X	⟶	XX
1917	XX	Cresylic acid	Tr

Potassium Permanganate.

Year.	Plot 8. Rate 26 cwt. per acre.		
	Before.		After.
1915	X	⟶	O
1916	O	Nothing	O
1917	O	Nothing	X

Year.	Plot 18. Rate 3 cwt. per acre.		
	Before.		After.
1915	X	⟶	X
1916	—	Plot subdivided	—
1917	—	—	—

Potassium Bichromate.

Year.	Plot 22. Rate 14 cwt. per acre.		
	Before.		After.
1915	XX	⟶	O
1916	O	Nothing	O
1917	O	Nothing	O

Diseased Subsoils Treated with Elements.

Sulphur.

Year.	Plot 27. Rate 30 cwt. per acre.		
	Before.		After.
1915	XXXX	⟶	XXXX
1916	XXXX	Vaporite	XXXX
1917	XXXX	$HgCl_2$	X

Iodine.

Year.	Plot 54. Rate 2 cwt. per acre.		
	Before.		After.
1915	—	Nothing	XX
1916	XX	⟶	XX
1917	XX	NaCN	O

Diseased Subsoils Treated with Disinfectant Fluids, mainly Proprietary.

Saponified Creosote.

Year.	Plot 2. Rate 487 gal. per acre.		
	Before.		After.
1915	XX	Nitric acid	X
1916	X	→	O
1917	O	Nothing	XX

Year.	Plot 57. Rate 870 gal. per acre.		
	Before.		After.
1915	XXX	Creol	XXX
1916	XXX	Creol	XX
1917	XX	→	XXXX

Year.	Plot 58*a*. Rate 870 gal. per acre.		
	Before.		After.
1915	XXXX	Creol	XXXX
1916	XXXX	Carbosol	XX
1917	XX	→	XXX

Year.	Plot 58*b*. Rate 870 gal. per acre.		
	Before.		After.
1915	XXXX	Creol	XXXX
1916	XXXX	Carbosol	XXX
1917	XXX	→	XXX

Year.	Plot 60. Rate 700 gal. per acre.		
	Before.		After.
1915	XXX	Creol	XXX
1916	XXX	" V.C."	XX
1917	XX	→	XXX

Year.	Plot 32. Rate 870 gal. per acre.		
	Before.		After.
1915	XXX	Evans's S. S.	XXX
1916	XXX	Clubicide	Tr
1917	Tr	→	X

Year.	Plot 68. Rate 870 gal. per acre.		
	Before.		After.
1915	—	—	—
1916	—	Nothing	X
1917	X	→	X

Year.	Plot 69. Rate 870 gal. per acre.		
	Before.		After.
1915	—	—	—
1916	—	Nothing	X
1917	X	→	X

Year.	Plot 70. Rate 870 gal. per acre.		
	Before.		After.
1915	—	—	—
1916	—	Nothing	X
1917	X	→	O

Year.	Plot 59. Rate 870 gal. per acre.		
	Before.		After.
1915	XXX	Creol	XXX
1916	XXX	" V.N."	XXXX
1917	XXXX	→	XXXX

Year.	Plot 49. Rate 870 gal. per acre.		
	Before.		After.
1915	—	—	XX
1916	XX	Creosote	XX
1917	XX	→	XXX

Creol.

Year.	Plot 57. Rate 261 gal. per acre.		
	Before.		After.
1915	XXX	⟶	XXX
1916	XXX	Creol	XX
1917	XX	Saponified creosote	XXXX

Year.	Plot 58*a*. Rate 261 gal. per acre.		
	Before.		After.
1915	XXXX	⟶	XXXX
1916	XXXX	Carbosol	XX
1917	XX	Saponified creosote	XXX

Year.	Plot 58*b*. Rate 261 gal. per acre.		
	Before.		After.
1915	XXXX	⟶	XXXX
1916	XXXX	Carbosol	XXX
1917	XXX	Saponified creosote	XXX

Year.	Plot 59. Rate 261 gal. per acre.		
	Before.		After.
1915	XXX	⟶	XXX
1916	XXX	"V.N."	XXXX
1917	XXXX	Saponified creosote	XXXX

Year.	Plot 60. Rate 261 gal. per acre.		
	Before.		After.
1915	XXX	⟶	XXX
1916	XXX	"V.C."	XX
1917	XX	Saponified creosote	XXX

Year.	Plot 57. Rate 1,210 gal. per acre.		
	Before.		After.
1915	XXX	Creol	XXX
1916	XXX	⟶	XX
1917	XX	Saponified creosote	XXXX

"Clubicide."

Year.	Plot 44. Rate 115 gal. per acre.		
	Before.		After.
1915	XXX	⟶	XX
1916	XX	Cresylic acid	X
1917	X	Cresylic acid	O

Year.	Plot 32. Rate 428 gal. per acre.		
	Before.		After.
1915	XXX	Evans's S. S.	XXX
1916	XXX	⟶	Tr
1917	Tr	Saponified creosote	X

Year.	Plot 6. Rate 39 cwt. per acre.		
	Before.		After.
1915	XX	⟶	O
1916	O	Nothing	XX
1917	XX	Twiset	XXXX

"*Carbosol.*"

Year.	Plot 45. Rate 115 gal. per acre.		
	Before.		After.
1915	X	⟶	O
1916	O	Nothing	Tr
1917	Tr	Cresylic acid	O

Year.	Plot 58*a*. Rate 352 gal. per acre.		
	Before.		After.
1915	XXXX	Creol	XXXX
1916	XXXX	⟶	XX
1917	XX	Saponified creosote	XXX

Year.	Plot 58*b*. Rate 177 gal. per acre.		
	Before.		After.
1915	XXXX	Creol	XXXX
1916	XXXX	⟶	XXX
1917	XXX	Saponified creosote	XXX

"*Black Carbolic Disinfectant.*"

Year.	Plot 14. Rate 230 gal. per acre.		
	Before.		After.
1915	XXX	⟶	XXX
1916		Repeated	
1917	—	—	—

Year.	Plot 14. Rate 460 gal. per acre.		
	Before.		After.
1915	XXX	Black carbolic disinfectant	XXX
1916	XXX	⟶	X
1917	X	Pyridine	XXX

Year.	Plot 39. Rate 128 gal. per acre.		
	Before.		After.
1915	X	⟶	X
1916	X	Cresylic acid	X
1917	X	Saponified creosote	O

"*Izal.*"

Year.	Plot 43. Rate 121 gal. per acre.		
	Before.		After.
1915	XX	⟶	X
1916	X	Cresylic acid	X
1917	X	Cresylic acid	Tr

Year.	Plot 10. Rate 325 gal. per acre.		
	Before.		After.
1915	XX	⟶	X
1916		Repeated	
1917	—	—	—

Year.	Plot 10. Rate 670 gal. per acre.		
	Before.		After.
1915	XX	Izal	X
1916	X	⟶	O
1917	O	Nothing	XX

Jeyes' Fluid.

Year.	Plot 42. Rate 121 gal. per acre.		
	Before.		After.
1915	XXX	⟶	XX
1916	XX	Cresylic acid	X
1917	X	Cresylic acid	X

Year.	Plot 15. Rate 242 gal. per acre.		
	Before.		After.
1915	XXX	⟶	XX
1916		Repeated	
1917	—	—	—

Year.	Plot 15. Rate 517 gal. per acre.		
	Before.		After.
1915	—	—	—
1916	XX	⟶	O
1917	O	Nothing	XXX

Lysol.

Year.	Plot 26. Rate 182 gal. per acre.		
	Before.		After.
1915	XX	⟶	O
1916	O	Nothing	XX
1917	XX	$HgCl_2$	Tr

Year.	Plot 19. Rate 312 gal. per acre.		
	Before.		After.
1915	XXXX	⟶	XXX
1916		Repeated	
1917	—	—	—

Year.	Plot 19. Rate 626 gal. per acre.		
	Before.		After.
1915	—	—	—
1916	XXX	⟶	XXX
1917	XXX	NaCN	O

Paraffin Emulsion.

Year.	Plot 51. Rate 730 gal. per acre.		
	Before.		After.
1915	—	—	—
1916	XX	⟶	XXX
1917	XXX	Pyridine	XXX

Year.	Plot 55. 1,090 gal. per acre.		
	Before.		After.
1915	—	$KMnO_4$	XX
1916	XX	⟶	XXX
1917	XXX	NaCN	O

Turpentine Emulsion.

Year.	Plot 50. Rate 437 gal. per acre.		
	Before.		After.
1915	—	Nothing	X
1916	X	⟶	XX
1917	XX	Twiset	XX

Evans's Soil Steriliser.

Year.	Plot 32. Rate 52 gal. per acre.		
	Before.		After.
1915	XXX	→	XXX
1916	XXX	Clubicide	Tr
1917	Tr	Saponified creosote	X

"Twiset."

Year.	Plot 3. Rate 165 gal. per acre.		
	Before.		After.
1915	XX	K_2SO_4	X
1916	X	K_2SO_4	XX
1917	XX	→	XXX

Year.	Plot 4. Rate 165 gal. per acre.		
	Before.		After.
1915	XXXX	Phenol	O
1916	O	Nothing	Tr
1917	Tr	→	Tr

Year.	Plot 5. Rate 165 gal. per acre.		
	Before.		After.
1915	XXXX	Kainit	O
1916	O	Nothing	XXX
1917	XXX	→	XXXX

Year.	Plot 6. Rate 165 gal. per acre.		
	Before.		After.
1915	XX	Clubicide	O
1916	O	Nothing	XX
1917	XX	→	XXXX

Year.	Plot 7. Rate 165 gal. per acre.		
	Before.		After.
1915	XXX	NaCl	O
1916	O	Nothing	X
1917	X	→	XXX

Year.	Plot 9. Rate 165 gal. per acre.		
	Before.		After.
1915	X	Copper sulphate	O
1916	O	Nothing	Tr
1917	Tr	→	X

Year.	Plot 48. Rate 165 gal. per acre.		
	Before.		After.
1915	—	Nothing	X
1916	X	Creosote	XXX
1917	XXX	→	XXX

Year.	Plot 50. Rate 165 gal. per acre.		
	Before.		After.
1915	—	Nothing	X
1916	X	Turpentine emulsion	XX
1917	XX	→	XX

Diseased Subsoils Treated with Various Coal Tar Bye-Products.

Phenol.

Year.	Plot 4. Rate 42 cwt. per acre.		
	Before.		After.
1915	XXXX	→	O
1916	O	Nothing	Tr
1917	Tr	Twiset	Tr

Year.	Plot 31. Rate 15½ cwt. per acre.		
	Before.		After.
1915	X	→	O
1916	O	Nothing	O
1917	O	Nothing	X

Phenol—(cont.).

Year.	Plot 47*a*. Rate 29 cwt. per acre.		
	Before.		After.
1915	—	—	XX
1916	XX	——→	O
1917	O	Nothing	O

Year.	Plot 47*b*. Rate 29 cwt. per acre.		
	Before.		After.
1915	—	—	XX
1916	XX	——→	X
1917	X	Cresylic acid	O

Year.	Plot 47*c*. Rate 29 cwt. per acre.		
	Before.		After.
1915	—	—	XX
1916	XX	——→	O
1917	O	Nothing	O

Year.	Plot 47*d*. Rate 29 cwt. per acre.		
	Before.		After.
1915	—	—	XX
1916	XX	——→	O
1917	O	Nothing	O

Creosote.

Year.	Plot 48. Rate 640 gal. per acre.		
	Before.		After.
1915	—	Nothing	X
1916	X	——→	XXX
1917	XXX	Twiset	XXX

Year.	Plot 49. Rate 640 gal. per acre.		
	Before.		After.
1915	—	Nothing	XX
1916	XX	——→	XX
191	XX	Creosote emulsion	XXX

Pyridine.

Year.	Plot 51. Rate 16 cwt. per acre.		
	Before.		After.
1915	—	—	XX
1916	XX	Paraffin emulsion	XXX
1917	XXX	——→	XXX

Year.	Plot 14. Rate 16 cwt. per acre.		
	Before.		After.
1915	XXX	Black carbolic disinfectant	XXX
1916	XXX	Black carbolic disinfectant	X
1917	X	——→	XXX

Year.	Plot 17. Rate 16 cwt. per acre.		
	Before.		After.
1915	XXX	Chlorinated lime	XXX
1916	XXX	Common salt	X
1917	X	——→	X

Naphthalene.

Year.	Plot 53. Rate 17 cwt. per acre.		
	Before.		After.
1915	—	$KMnO_4$	X
1916	X	——→	XX
1917	XX	NaCN	O

Cresylic Acid or Liquid Carbolic Acid.

Year.	Plot 62. Rate 427 gal. per acre.		
	Before.		After.
1915	—	—	—
1916	—	Nothing	X
1917	X	⟶	O

Year.	Plot 42. Rate 242 gal. per acre.		
	Before.		After.
1915	XXX	Jeyes'	XX
1916	XX	⟶	X
1917	—	—	—

Year.	Plot 44. Rate 484 gal. per acre.		
	Before.		After.
1915	XXX	Clubicide	XX
1916	XX	⟶	X
1917	X	Cresylic acid	O

Year.	Plot 61. Rate 1089 gal. per acre.		
	Before.		After.
1915	—	—	X
1916	X	⟶	O
1917	O	Nothing	Tr

Year.	Plot 41. Rate 465 gal. per acre.		
	Before.		After.
1915	XXXX	KCN	O
1916	O	Nothing	Tr
1917	Tr	⟶	O

Year.	Plot 45. Rate 465 gal. per acre.		
	Before.		After.
1915	X	Carbosol	O
1916	O	Nothing	Tr
1917	Tr	⟶	O

Year.	Plot 34. Rate 465 gal. per acre.		
	Before.		After.
1915	X	"V.C."	O
1916	O	Nothing	X
1917	X	⟶	O

Year.	Plot 35. Rate 333 gal. per acre.		
	Before.		After.
1915	XXX	"V.N."	XXX
1916	XXX	⟶	XXX
1917		Repeated	

Year.	Plot 36. Rate 333 gal. per acre.		
	Before.		After.
1915	X	Vaporite	X
1916	X	⟶	Tr
1917		Repeated	

Year.	Plot 37. Rate 465 gal. per acre.		
	Before.		After.
1915	X	Chlorinated lime	X
1916	X	Copper sulphate	XX
1917	XX	⟶	Tr

Year.	Plot 43. Rate 242 gal. per acre.		
	Before.		After.
1915	XX	Izal	X
1916	X	⟶	X
1917	X	Repeated	Tr

Year.	Plot 39. Rate 242 gal. per acre.		
	Before.		After.
1915	X	Black carbolic disinfectant	X
1916	X	⟶	X
1917		Repeated	

Year.	Plot 35. Rate 465 gal. per acre.		
	Before.		After.
1915	XXX	"V.N."	XXX
1916	XXX	Cresylic acid	XXX
1917	XXX	⟶	XX

Year.	Plot 47*b*. Rate 415 gal. per acre.		
	Before.		After.
1915	—	—	—
1916	XX	Phenol	X
1917	X	⟶	O

Cresylic Acid or Liquid Carbolic Acid—(cont.).

Year.	Plot 39. Rate 465 gal. per acre.		
	Before.		After.
1915	X	Black carbolic disinfectant	X
1916	X	Cresylic acid	X
1917	X	⟶	O

Year.	Plot 43. Rate 465 gal. per acre.		
	Before.		After.
1915	XX	Izal	X
1916	X	Cresylic acid	X
1917	X	⟶	Tr

Year.	Plot 36. Rate 465 gal. per acre.		
	Before.		After.
1915	X	Vaporite	X
1916	X	Cresylic acid	Tr
1917	Tr	⟶	X

Year.	Plot 42. Rate 465 gal. per acre.		
	Before.		After.
1915	XXX	Jeyes'	XX
1916	XX	Cresylic acid	X
1917	X	⟶	X

Year.	Plot 44. Rate 465 gal. per acre.		
	Before.		After.
1915	XXX	Clubicide	XX
1916	XX	Cresylic acid	X
1917	X	⟶	O

Diseased Subsoils Treated with Proprietary Powders.

Vaporite.

Year.	Plot 36. Rate 15 cwt. per acre.		
	Before.		After.
1915	X	⟶	X
1916	X	Cresylic acid	Tr
1917	Tr	Cresylic acid	X

Year.	Plot 27. Rate 69 cwt. per acre.		
	Before.		After.
1915	XXXX	Sulphur	XXXX
1916	XXXX	⟶	XXXX
1917	XXXX	$HgCl_2$	X

"V.N." Powder.

Year.	Plot 59. Rate 112 cwt. per acre.		
	Before.		After.
1915	XXX	Creol	XXX
1916	XXX	⟶	XXXX
1917	XXXX	Saponified creosote	XXXX

Year.	Plot 35. Rate 56 cwt. per acre.		
	Before.		After.
1915	XXX	⟶	XXX
1916	XXX	Cresylic acid	XXX
1917	XXX	Cresylic acid	XX

"V.C." Powder.

Year.	Plot 34. Rate 53 cwt. per acre.		
	Before.		After.
1915	X	⟶	O
1916	O	Nothing	X
1917	X	Cresylic acid	O

Year.	Plot 60. Rate 112 cwt. per acre.		
	Before.		After.
1915	XXX	Creol	XXX
1916	XXX	⟶	XX
1917	XX	Saponified creosote	XXX

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

XXXII.—Experiments on the Control of Narcissus Eelworm in the Field.

By J. K. Ramsbottom, N.D.H.

Experiments were conducted throughout the Autumn of 1917 to determine the possibility of bringing land which had carried crops of diseased bulbs to a state of profitable production. One acre of highly infected land in the Spalding district was kindly placed at our disposal for these experiments. This land had been planted with Narcissus bulbs in 1915, and in the Spring of 1917 the eelworm disease was so prevalent that it was considered unprofitable to expend labour on lifting them in the approaching Autumn of that year. The grower simply hoed off the foliage of the bulbs that remained in April and drilled the ground with onions in the hope that he would get some profitable return from the ground. It is interesting to note that, although the onions germinated freely, the young plants wholly disappeared owing to eelworm attack. It was decided that this piece of ground afforded an excellent opportunity for carrying on field experiments.

Nature of the Experiments.—The experiments are classified into three series. The first series was concerned with the application of manures, the second with the chemical sterilization of the soil, and the third with cropping small areas of the ground with crops which have been recorded as host plants of *Tylenchus devastatrix*.

Plan of Experiments.—Before marking out the beds the ground was ploughed, harrowed, and rolled. The ground was then marked out into one large rectangular bed 211 ft. by 161 ft. (area 3774 sq. yds.). This rectangular plot was then sub-divided into two halves, 191 ft. by 73 ft., with a 5 ft. path intervening.

The beds devoted to the applications of manures (Series I.) were 20 ft. by 20 ft. (area 400 sq. ft.), and are represented on the plan by the letters A to J and duplicated A^1 to J^1. These beds were separated by two-foot paths taken out to a depth of four inches.

The beds set down for the chemical sterilization of the soil (Series II.) were 12 ft. by 6 ft. (36 sq. ft.), and are represented on the plan by the letters K to T and duplicated K^1 to T^1. A pathway of 3 feet separated the beds. Surrounding these beds at a distance of 6 ft. a 12 ft. break of rye was sown in the Autumn in order to isolate the enclosed beds from windswept soil, and so reduce the possibility of infected soil being blown on to the plots after treatment.

This belt of rye was again surrounded at a distance of 6 ft. with a 12 ft. border of ground which was occupied with the susceptible crops (Series III.).

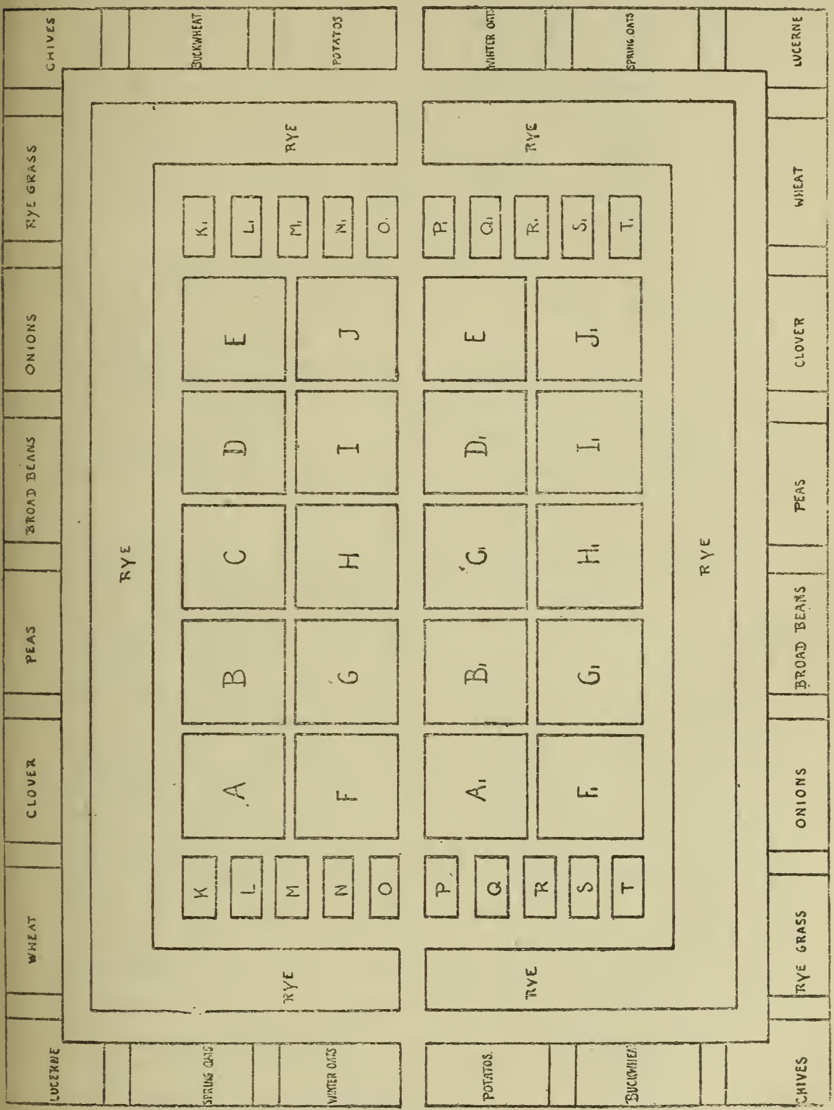

FIG. 18.—PLAN OF TREATMENT OF SOIL AGAINST EELWORM ATTACK UPON NARCISSUS.
FOR REFERENCES SEE TEXT.

MANURIAL EXPERIMENTS (SERIES I.).

It has often been stated that manuring, especially with potassic compounds. is beneficial and can be relied upon to help the plants to resist the attacks of eelworm. The manuies and combinations of manures employed in these experiments have from time to time been recommended as being valuable in supporting the plants against eelworm attack.

The following fertilizers and combinations of fertilizers were tested :—

Plots A, J, C¹, F¹ :	Controls.		
,, B and J¹ :	Sulphate of Potash at the rate of	½	cwt. to the acre.
,, C and E¹ :	Sulphate of Potash ,, ,,	1	,,
,, D and D¹ :	Sulphate of Potash ,, ,,	3	,,
,, E and B¹ :	Sulphate of Potash ,, ,,	12	,,
,, F and H¹ :	Sulphate of Potash 3 parts; Sulphate of Ammonia 3 ,,; Superphosphate 4 ,, — ,, ,,	4	,,
,, G and G¹ :	Bone Meal 1 part; Sulphate of Potash 1 ,,; Sulphate of Ammonia 1 ,, — ,, ,,	3	,,
,, H and I¹ :	Sulphate of Potash 3 parts; Sulphate of Ammonia 1 part — ,, ,,	4	,,
,, I and A¹ :	Sulphate of Iron at the rate of	4	,,

The manures were applied to the plots previous to the planting of the bulbs in September.

The bulbs were obtained from a nursery which, in my opinion, was free from the eelworm disease, and these bulbs only were employed throughout the experiments, the variety being 'Emperor.'

A hundred bulbs were planted in the centre of each bed in ten rows and ten bulbs in each row, at a distance of six inches apart from bulb to bulb, and one foot apart between the rows.

The plots were examined at frequent intervals during the Spring, and the growth came away free and clear, and the foliage showed no external signs of the disease. When examined at the time of the flowering it was quite impossible to distinguish any difference in the growth of the bulbs on the treated plots from that of the bulbs growing on the control plot. It was decided at this stage of the experiment that it would be necessary to leave the bulbs down another year, and the plots were examined once only after flowering. Unfortunately, at a later date, the experimental ground was urgently required for another purpose, and consequently the bulbs were lifted in August 1918. In view of the behaviour of the growth in the Spring it was somewhat surprising to find on cutting open the lifted bulbs that between 70 and 80 per cent. of the bulbs on *each* plot were diseased, and that bulbs on the plots which had received the dressings of fertilizers were diseased to the same extent as those bulbs which had been growing on the untreated or control plots. No record was kept as to the behaviour of the growth at the "dying down" period, and it is assumed that the bulbs were probably affected at this stage of their growth. This fact, however, does not alter the conclusion that must be drawn from the results of these experiments, namely, that the treatment of infected ground with the fertilizers and combinations of fertilizers experimented with, cannot be depended upon to support the Narcissus against infection by eelworm from the treated soil.

Chemical Sterilization Experiments (Series II.).

Although the experiments of previous workers with chemical sterilization of the soil for the root-knot eelworm (*Heterodera radicicola*) had proved ineffectual, it was thought desirable to conduct this series of experiments to test the possibility of finding some chemical which would prove successful in controlling the Narcissus eelworm (*Tylenchus devastatrix*). The chemicals employed were gas-lime, calcium carbide, naphthalene, worm-killer, carbon-bisulphide, toluol, formaldehyde, ammonia, and a proprietary preparation, and were applied at the following rates :—

Plots	K and P¹ :	Gas lime	at the rate of 8 lb. to the square yard.
,,	L and Q¹ :	Calcium carbide	,, ,, 1½ ,,
,,	M and R¹ :	Naphthaline (flaked)	,, ,, 3 oz. ,,
,,	N and S¹ :	Worm killer	,, ,, 2 ,,
,,	O and T¹ :	Control	
,,	P and K¹ :	Carbon-bisulphide	,, ,, 4 ,,
,,	Q and L¹ :	Toluol	,, ,, 4 ,,
,,	R and M¹ :	Formaldehyde 40 per cent.	One part in 20 parts of water at the rate of 1 gallon to the square foot.
,,	S and N¹ :	Ammonia 30 per cent.	At the rate of twelve ounces to the square yard.
	T and O¹ :	Proprietary preparation.	According to directions.

The carbon-bisulphide, toluol, and ammonia were applied by means of the Vermerol injector, the depth of injection being one foot, and twelve holes made to the square yard. The formaldehyde solution was applied by means of a watering-can. The gas-lime, naphthalene, calcium carbide, and worm-killer were distributed by hand and forked into the top twelve inches of soil. The plots were treated throughout the same day and six weeks previous to planting the bulbs.

The beds were examined in the Spring, and, as in the case of the bulbs in the manured plants, the growth was clean and healthy. The bulbs were lifted in the Autumn, and in every instance the treated plots produced diseased bulbs, and no difference was apparent in the extent of the disease between the bulbs from the treated plots and those from the control.

The results of these experiments point to the conclusion that the treatment used could not be depended upon to free the soil from eelworm.

Susceptible Crop Experiments (Series III.).

This series of experiments was included, as it is of importance to give such a rotation as will not place a crop liable to be attacked in immediate succession to an affected crop of Narcissi ; it was therefore necessary to see if crops liable to attack by the Narcissus eelworm could be sown with safety on land which had carried diseased bulbs.

Tylenchus devastatrix has been recorded on rye, winter and spring oats, clover, lucerne, peas, broad beans, rye-grass, onions, wheat, chives, buckwheat, and potatos.

The plots for these experiments were sown or planted with the above crops on the outside border, except for the rye, which occupied the belt of ground utilized for isolating the experimental beds of Series I. and Series II.

The plants were examined from the seedling stage onward throughout the growing season, and, except in the case of onions, the various crops were unaffected with eelworm. The results of the experiments clearly show that onions should not follow in immediate succession on land which has borne a diseased crop of Narcissi. The behaviour of the other crops coincides with the results of experiments made by RITZEMA BOS in 1910, by which he formulated his biological strain theory, which, in brief, is that *Tylenchus devastatrix* becomes so adapted to a particular species of host plant that it will not attack with any severity any other species.

In conjunction with the above experiments, pot culture experiments were made at Wisley. Six-inch pots of sterilized soil were sown with rye, winter and spring oats, broad beans, wheat, buckwheat, clover, lucerne, peas, and onions. The pots were watered once with water containing eelworms grown in pure culture. There again onions were the only plants affected with the eelworm, and the photograph clearly illustrates the deformed growth of the affected seedling plants (fig. 19).

XXXIII.—THE EFFECT OF "PLACE" ON YIELD OF CROPS.

By F. J. CHITTENDEN, F.L.S., V.M.H.

IN a note on the effect of position on the yield of plants * it was shown that the outer row of a plot of turnips, having a greater space and therefore both a greater volume of soil from which to draw supplies and better illumination, gave a greater yield than either of the inner ones otherwise similarly treated.

In some experimental plots of potatos the opportunity occurred to test the effect of "place" upon the yield of this crop, and, as will be seen, it proves remarkably sensitive.

The arrangement of the plots is shown in the plan (fig. 20). There were sixteen plots in pairs, each planted so that several feet separated the first row of potatos from other plants, four or five feet also separated the outermost of the plants on one pair of plots from those on the next pair. Each plot had three rows of potato 'Up-to-Date' planted on its eastern side (rows A, B, C), and these were followed towards the west by rows of other varieties, all the rows equal distances apart, and each row contained eighteen plants equally distributed along it. The different plots each received different treatment, but the treatment of all the plants on any one plot was the same.

We are only now concerned with the plants of 'Up-to-Date,' of which each plot carried fifty-four. Eighteen of these formed the

* In *Journal R.H.S.* xli. p. 68.

FIG. 19.—ONION SEEDLINGS MALFORMED THROUGH ATTACK OF THE EELWORM, TYLENCHUS DEVASTATRIX.

[*To face p. 72.*

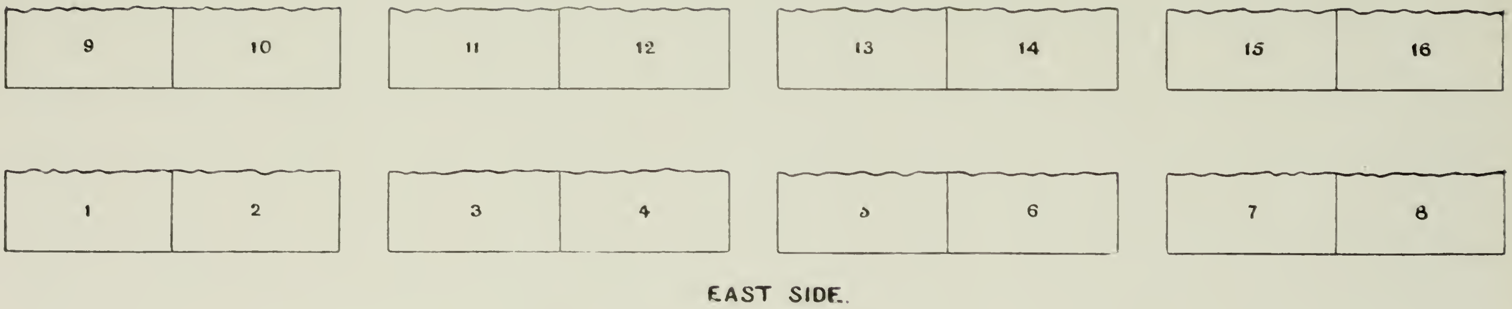

FIG. 20.—PLAN OF POTATO-PLANTING DESCRIBED ON PAGE 72.

Other Potatos here

Row C E I I I I I I I I I I I I I I I I I

Row B E I I I I I I I I I I I I I I I I I

Row A X O O O O O O O O O O O O O O O O O

Plot 2 here

FIG. 21.—DIAGRAM ILLUSTRATING THE ARRANGEMENT OF POTATOS ON PLOTS SHOWN IN FIG. 20.

I, inside plants with least space. E, end plants of inner rows.
O, plants of outer row. X, corner plant with greatest space.

[To face p. 73.

outer row (Row A, fig. 21) and therefore had on one side, the east, greater space than on the other, where the soil space and illumination was the same as the two inner rows had on both sides.

In the following Table the total yields of each of these sixteen outer rows (taken as 100) is compared with the total yields of the inner rows on the same plot.

Plot.	Outer row.	Inner row 1.	Inner row 2.
1	100	59·2	57
2	100	64·9	68·4
3	100	68·5	77·8
4	100	78·5	71·1
5	100	87·0	89·0
6	100	82·0	87·5
7	100	83·0	74·0
8	100	70·0	70·0
9	100	62·0	61·5
10	100	78·0	76·0
11	100	70·0	68·0
12	100	66·5	81·5
13	100	63·0	68·5
14	100	62·8	50·6
15	100	76·0	70·8
16	100	69·2	68
Total	100	72·0	72·0

In every case, as well as in the aggregate, the yield of the outer row was markedly greater than was the yield of either of the corresponding inner rows.

The plants in the rows did not have equal exposure, for reference to the plan will show that one plant in each row (lettered X and E on fig. 21) had a greater exposure on either the north or the south side than had the others in that row. There were thus forty-eight plants with greater exposure than the remainder. Did this extra space increase the yield? The total weight of crop from these forty-eight plants was 107 lb. 12 oz. If we find the average yields of the remaining seventeen plants of each of the forty-eight rows and add them together we obtain a total of 88 lb. 12½ oz. The yield of the end plants of the rows compared with the average of the others in the same rows is thus as 100 to 82. The end position in the row is apparently a distinctly favourable one.

Figures for some other series of experimental plants where all the plants in each row were similarly treated, although not all the rows on the plot were of the same variety, enable us to test the general applicability of this statement.

In one series of eighty rows the total weight of the end plants amounted to 295 lb. 15 oz. The total of the averages of the inner plants in the rows was 257 lb. 1½ oz. This result gives 100 to 87 in favour of the end plants.

In another of nineteen rows the figures are 62 lb. 10 oz. and 57 lb. 12½ oz. respectively, being 100 : 92 in favour of the end plants.

In another of one hundred rows they are 100 : 88·4.

There seems, therefore, no doubt that the end plant has a considerable advantage over others in the row.

Reference to the plan will show that of the end plants in the planting series there referred to, sixteen, *i.e.* one at the exposed corner of each plot (marked X on the plan, fig. 21) was open on two sides, while the other thirty-two (E on plan) were open on but one. This extra exposure made its influence felt, for the sixteen plants gave a total yield of 46 lb. 7 oz., the thirty-two only 61 lb. 5 oz., *i.e.* 100 : 66 in favour of the corner plants. The average yield of these corner plants was also much better than that of the other plants in the outer row as 100 : 79, and compared with the inner plants on the plots as 100 : 57.

The best "place" is therefore the corner site (X), next a place in the outer row (O), next a place at the end of one of the inner rows (E), and the least favourable an inner place (I, fig. 21).

Place is therefore an important factor in the yield of potatos, and it is clearly necessary in making comparisons between yields on different plots to ensure that the exposures of the plants on the comparable plots are exactly the same. Where, for instance, variety trials are made and comparisons desired between crops, not only must the distances between the rows be the same and the distances between the plants in the rows, but the outer row must be discarded. In all the trials at Wisley an outer row is planted which does not enter into the trial at all. In some cases it is necessary, in order to secure equal exposure for all the plants in an experimental planting, to discard the end plants of the rows as well, but this is not usually necessary when in a variety trial the whole length of a row consists of one variety.

XXXIV.—On Double Stocks.

By P. J. Jaramillo and F. J. Chittenden, F.L.S., V.M.H.

The all but universal wish of the cultivator of stocks to plant out only those that will give double flowers has led to a large number of recommendations as to their raising and selection. Miss E. R. Saunders has given a summary of the "various methods which have been advocated in the past as leading to the production of doubles among Stocks, but which have proved on investigation to be without effect," in this Journal, vol. xl. pp. 459–465. Having dismissed all thirteen methods as failing of their purpose, she suggests that the high percentages often quoted may be due not to the methods consciously set out to be followed, but to the unconscious selection of the most vigorous plants at transplanting time. She subjected this suggestion to investigation and concluded * "that doubles on the whole develop

* "A Suggested Explanation of the Abnormally High Records of Doubles quoted by Growers of Stocks (*Matthiola*)."—*Jour. of Genetics*, 5 (1915), pp. 137–143.

more rapidly and vigorously than the singles, and that where the period of development is sufficiently prolonged, selection based on this difference can be used as a means of securing a higher proportion of doubles in the beds than corresponds with the actual output from the parent plants."

Here it is to be observed the conscious selection of the more vigorous seedlings is advocated as a means of securing an abnormally high percentage of doubles, and Miss SAUNDERS suggests that similar selection carried out unconsciously accounts for the high percentages of doubles often claimed and doubtless obtained.

An extensive trial of stocks at Wisley in 1916–17 gave us an opportunity of testing upon a fairly large scale and with a great diversity of stocks how far this selection of the most vigorous plants carried out by workers without great experience in selecting stocks for doubleness would result in obtaining abnormally high percentages of doubles. As Miss SAUNDERS has pointed out in her paper already quoted, " the actual output of doubles among strains of Stocks now in cultivation does not on the average exceed 56–57 per cent., and should perhaps be put somewhat lower—possibly 53–54 per cent."

The method adopted was as follows : The seed of each strain was thinly sown in a pot of soil which had been very thoroughly mixed so as to avoid as far as possible any inequalities. When the seedlings of each strain were large enough they were pricked out into a box in order of vigour and grouped in three categories—vigorous, medium, and weak. The number of plants in each of the three categories varied greatly with the different strains, but the grouping was done by one of us in every case, so that the same standard was kept up all through. When large enough some of the plants were removed from the boxes into pots, and again potted later into their flowering pots.

It soon became evident that after pricking out into boxes the vigorous plants did not in every case maintain their lead. At potting time indeed it not infrequently happened that several of those which at pricking-out time were placed in the weak group were more vigorous than the primarily vigorous ones. In all cases the most vigorous plants were chosen from the boxes for potting on, irrespective of their original classification, but note was kept of the place originally occupied by every plant in the original classification, so that the character not only of the plants most vigorous at the potting-on time could be determined as far as doubleness went, but track could also be kept of the fate of those in the different groups at pricking-out time. The plants left in the boxes were kept to flower in them so far as they would. Plans were made of every box (fig. 22), and the character of each plant noted as it came into flower, whether in a pot or in a box, and in this way the ultimate fate of each group was ascertained.

Of the plants pricked out into boxes a few died either in the boxes or after being potted up; and unfortunately a large proportion of those left behind in the boxes at flowering time failed to flower.

The following Table shows the numbers at pricking-out time of

No. of Culture.	Plants at pricking-out time.												12 most vigorous plants at potting time.		Total doubles.	Total singles.
	Vigorous. Total.	Vigorous. Double.	Vigorous. Single.	Vigorous. Failed.	Medium. Total.	Medium. Double.	Medium. Single.	Medium. Failed.	Weak. Total.	Weak. Double.	Weak. Single.	Weak. Failed.	Double.	Single.		
†1	0	—	—	—	24 (11)	6	14	4	4 (1)	1	1	2	3	9	7	15
2	24 (5)	7	7	10	12 (7)	4	4	4	4	1	2	1	6	6	12	13
3	12 (4)	6	2	4	18 (7)	6	2	10*	12 (1)	—	1	11	6	5	12	5
4	17 (5)	8	4	5	18 (7)	9	2	7	12	1	—	11	8	4	18	6
5	18 (3)	10	2	6	18 (9)	8	5	5	12	1	—	11	7	5	19	7
6	18 (4)	11	6	1	18 (8)	7	10	1	12	5	1	6	6	6	23	17
7	18 (9)	10	6	2	6 (1)	3	3	—	4 (2)	2	1	1	8	4	15	10
8	18 (3)	4	1	13	18 (5)	5	2	11	12 (4)	2	2	8	7	5	11	5
†9	16 (6)	1	15	—	10 (6)	2	8	—	1	—	1	—	—	12	3	24
10	18	5	7	6	18 (12)	7	8	3	12	2	4	6	7	5	14	19
11	1	—	1	—	0	—	—	—	0	—	—	—	—	1	—	1
†12	18 (3)	2	8	8	18 (7)	5	6	7	12 (2)	—	2	10	4	8	7	16
13	18 (11)	8	9	1	6 (1)	3	3	—	2	2	—	—	7	5	13	12
14	18 (5)	12	3	3	18 (7)	11	5	2	12	3	3	6	10	2	26	11
15	18 (7)	7	7	4	18 (5)	5	6	7	8	3	1	4	6	6	15	14
16	18 (6)	9	2	7	18 (6)	3	5	10	12	—	—	12	5	6	12	7
17	6 (6)	6	—	—	8 (6)	3	5	—	2	—	1	1	7	5	9	5
†18	18 (3)	3	13	2	18 (6)	1	10	7	11 (3)	—	6	5	—	12	4	29
†19	18 (5)	4	6	8	18 (7)	4	6	8	12	—	—	12	6	6	8	12
†20	18 (2)	1	12	5	18 (7)	3	11	4	12 (3)	—	4	8	1	11	4	27
†21	18 (8)	4	11	3	12 (4)	1	11	—	1	—	—	1	2	10	5	22
†22	18 (5)	—	10	8	18 (7)	1	12	5	12	1	2	9	—	12	2	24
†23	18 (3)	5	8	5	18 (5)	2	12	4*	12 (4)	1	5	6	1	10	8	25
†24	18 (5)	3	9	6	18 (6)	1	12	5	6	—	—	6	2	9	4	21
†25	18 (3)	2	4	12	18 (7)	6	7	5	12 (2)	1	3	8	2	10	9	14
†26	18 (3)	2	5	11	18 (5)	1	12	5	12 (4)	1	6	5	2	10	4	23
27	16 (6)	8	4	4	16 (4)	8	5	3	12 (2)	1	4	7	6	6	17	13
28	18 (3)	3	5	10	18 (9)	5	9	4	12	3	2	7	5	7	11	16
†29	18 (2)	5	7	6	18 (10)	5	9	4	12	2	3	7	4	8	12	19

	†30	11 (3)	1	6	4	18 (5)	6	7	5	8 (4)	1	4	3	3	9	8	17
	31	17 (9)	7	4	6	5 (3)	2	3	—	4	—	1	3	7	5	9	8
	†32	11 (5)	1	4	6	17 (5)	2	3	12	—	—	—	—	3	7	3	7
	33	18 (6)	12	—	6	18 (4)	8	2	8	10 (2)	1	2	7	9	3	21	4
	34	17 (7)	5	4	8	6 (3)	2	3	1	3 (2)	2	—	1	5	7	9	7
	35	16 (6)	9	2	5	18 (5)	3	9	6	12 (1)	1	2	9	4	8	13	13
	36	18 (4)	4	—	14*	9 (5)	5	—	4	3 (2)	—	2	1	8	2	9	2
	37	18 (5)	5	1	12	18 (6)	5	2	11	12	—	—	12	8	3	10	3
	38	18 (9)	12	3	3	18 (3)	5	3	10	12	1	—	11	6	6	18	6
	39	18 (6)	11	1	6	18 (5)	7	4	7	6 (1)	3	—	3	12	—	21	5
	40	17 (5)	10	2	5	6 (4)	2	4	—	4 (2)	3	—	1	9	2	15	6
	41	18 (5)	4	1	13	8 (4)	1	3	4	1 (1)	1	—	—	6	4	6	4
	42	18 (7)	6	2	10	18 (5)	1	4	13	9	1	—	8	6	6	8	6
	43	18 (4)	12	5	1	18 (8)	3	15	—	5	1	3	1	2	10	16	23
	44	9 (4)	3	1	5	10 (8)	4	4	2	5	—	—	5	7	5	7	5
	45	18 (8)	15	1	2	18 (4)	7	7	4	10	1	2	7	10	2	23	10
	46	18 (3)	7	7	4	12 (8)	5	7	—	5 (1)	1	1	3	6	6	13	15
	47	18 (6)	4	2	12	18 (6)	2	4	12	0	—	—	—	6	6	6	6
	48	18 (5)	14	1	3	18 (6)	5	12	1	6 (1)	2	3	1	7	5	21	16
	49	18 (4)	3	1	14	18 (5)	3	2	13	12	0	1	11	6	3	6	4
	50	18 (6)	16	2	—	18 (5)	6	7	5	12 (1)	1	4	7	10	2	23	13
	51	18 (6)	13	2	3	6 (4)	1	4	1	2 (2)	—	2	—	7	5	14	8
	52	14 (4)	2	3	9	18 (6)	7	2	9	10 (1)	1	1	8	7	4	10	6
	53	18 (8)	8	2	8*	9 (4)	2	4	3	6	—	—	6	5	6	10	6
	54	18 (9)	11	3	4	18 ([illegible])	6	4	8	12	2	—	10	9	3	19	7
	55	18 (2)	4	—	14	18 (7)	5	4	9	12	2	—	10	6	3	11	4
	56	12 (9)	6	6	—	4 (3)	1	2	1	2	1	—	1	6	6	8	8
	57	18 (8)	10	4	4	18 (1)	5	5	8	12 (1)	1	—	11	7	3	16	9
	58	24 (10)	16	5	3	3 (1)	1	1	1	3	—	—	3	7	4	17	6
	59	18 (9)	11	1	6	18 (3)	4	4	10	0	—	—	—	10	2	15	5
	60	18 (5)	14	2	2	18 (7)	3	10	5	4	—	1	3	5	7	17	13
	†61	18 (7)	1	8	9	18 (5)	1	7	10	9	1	2	6	2	10	3	17
	62	18 (8)	14	2	2	18 (3)	3	7	8	6	2	—	4	10	1	19	9
	63	18 (8)	7	8	3	18 (4)	6	6	6	12	—	—	12	8	4	13	14
Carried forward .		1050 (335)	424	270	356	945 (340)	254	369	322	489 (50)	63	86	340	357	364	741	725

* One plant died.

	No. of Culture.	Plants at pricking-out time. Vigorous. Total.	Double.	Single.	Failed.	Medium. Total.	Double.	Single.	Failed.	Weak. Total.	Double.	Single.	Failed.	12 most vigorous plants at potting time. Double.	Single.	Total doubles.	Total singles.
Brought forward .		1050 (335)	424	270	356	945 (340)	254	369	322	489 (50)	63	86	340	357	364	741	725
	†64	18 (7)	4	9	5	18 (5)	2	9	7	12	—	2	10	2	10	6	20
	65	17 (5)	7	1	9	8 (4)	2	4	2	7 (3)	4	1	2	7	5	13	6
	†66	18 (5)	1	14	3	18 (6)	2	11	5	12 (1)	2	6	4	2	10	5	31
	67	18 (9)	14	1	3	18 (3)	6	4	8	12	2	—	10	11	1	22	5
	68	18 (5)	5	1	12	18 (4)	7	5	6	6 (3)	4	1	1	9	3	16	7
	69	18 (6)	12	—	6*	18 (5)	3	5	10	12	5	—	7	7	3	20	5
	70	18 (7)	9	—	9*	18 (5)	4	3	11	10	—	1	9	9	2	13	4
	†71	18 (6)	2	14	2	18 (6)	2	15	1	12	—	6	6	1	11	4	35
	72	18 (6)	8	9	1	18 (6)	4	14	—	9	1	4	4	6	6	13	27
	†73	18 (7)	1	10	7*	18 (5)	—	10	8	6	—	3	3	1	10	1	23
	74	17 (10)	7	7	3	6 (2)	2	3	1	4	1	2	1	6	6	10	12
	75	18 (8)	11	2	5	18 (4)	7	2	9	12	—	—	12	10	2	18	4
	76	18 (7)	10	2	6	18 (5)	3	4	11	12	2	—	10	9	3	15	6
	77	12 (2)	3	6	3	18 (10)	12	6	—	12	3	9	—	7	5	18	21
	78	17 (7)	7	1	9	18 (5)	3	2	13	12	—	—	12	10	2	10	3
	79	—	—	—	—	—	—	—	—	—	—	—	—	5	2	5	2
	80	10 (4)	7	1	2	18 (8)	8	3	7	10	—	—	10	10	2	15	4
	†81	18 (9)	3	15	—	18 (3)	7	7	4	12	2	3	7	3	9	12	25
	82	18 (8)	9	1	8	18 (3)	3	1	14	12	—	3	9	10	1	12	5
	83	30 (7)	10	9	11	3 (4)	—	2	1	3 (1)	—	2	1	6	6	10	13
	84	15 (2)	12	2	1	18 (9)	9	8	1	12 (1)	3	4	5	9	3	24	14
	85	18 (7)	3	5	10	18 (5)	5	3	10	12	2	1	9	7	5	10	9
	86	18 (9)	16	1	1	18 (3)	7	8	3	12	2	3	7	10	2	25	12
	87	14 (6)	2	4	8	12 (5)	3	2	7	3	1	—	2	5	6	6	6
	88	6 (5)	5	1	—	12 (5)	4	3	5	9 (1)	—	1	8	7	4	9	5
	89	9 (5)	3	4	2	18 (6)	10	2	6	12	1	1	10	7	4	14	7
	†90	9 (7)	2	7	—	4 (2)	1	3	—	4 (3)	2	2	—	2	10	5	12
	91	18 (9)	11	3	4	14 (2)	2	1	11	6 (1)	—	1	5	9	3	13	5
	92	18 (9)	7	3	8	18 (3)	3	1	14	12	—	—	12	8	4	10	4

	93	18 (8)	5	2	11*	18 (3)	5	1	12	12	1	—	11	8	2	11	3
	94	18 (6)	4	—	14	18 (6)	8	4	6	12	—	1	11	9	3	12	5
	95	17 (6)	5	6	6	11 (4)	4	2	5	12 (2)	1	3	8	6	6	10	11
	96	18 (6)	8	8	2	14 (5)	4	5	5	9 (1)	—	2	7	7	5	12	15
	97	15 (7)	7	—	8	18 (3)	3	—	15	12	—	—	12	10	—	10	—
	98	18 (5)	7	1	10	18 (6)	1	5	12	12	—	—	12	5	6	8	6
	†99	7 (7)	—	7	—	2 (2)	—	2	—	4 (3)	—	2	2*	—	11	—	11
	†100	7 (4)	1	6	—	6 (6)	—	6	—	6 (2)	—	5	1	1	11	1	17
	101	1	1	—	—	13 (10)	6	5	2	6 (1)	3	1	2	7	4	10	6
	102	11 (6)	5	4	2	18 (6)	6	3	9	12	1	—	11	8	4	12	7
	†103	0	—	—	—	24 (12)	5	13	6	3	—	—	3	3	9	5	13
	†104	18 (3)	7	10	1	18 (7)	7	6	5*	4 (1)	1	2	1	4	6	15	18
	†105	18 (9)	7	7	4	4 (1)	1	3	—	3 (2)	—	2	1	4	8	8	12
	†106	18 (7)	2	11	5	18 (5)	5	7	6	12	3	2	7	4	8	10	20
	†107	18 (5)	5	9	4	18 (5)	1	14	3	12 (2)	—	9	3	3	9	6	32
	108	14 (7)	10	3	1	18 (5)	6	4	8	10	4	—	6	8	4	20	7
	109	12 (5)	6	5	1	16 (4)	7	6	3	12 (3)	5	4	3	7	5	18	15
	†110	2 (1)	—	2	—	18 (11)	3	13	2	12	—	3	9	3	9	3	18
	†111	18 (9)	2	10	6	18 (3)	—	4	14	12	—	—	12	2	10	2	14
	112	15 (9)	11	—	4	18 (3)	6	2	10	8	—	—	8	12	—	17	2
	113	14 (4)	4	1	9	13 (7)	7	1	5	6 (1)	1	—	5	8	4	12	2
	114	18 (8)	6	5	7	18 (4)	3	3	12	12	—	—	12	7	5	9	8
	115	18 (8)	4	6	8	18 (3)	3	2	13	12 (1)	1	4	7	3	9	8	12
	116	18 (7)	4	4	10	18 (5)	2	3	13	12	—	—	12	5	7	6	7
	117	18 (6)	10	—	8	18 (5)	6	1	11	12 (1)	1	—	11	11	1	17	1
	118	18 (6)	7	2	9	18 (5)	5	2	11	9	—	—	9	8	3	12	4
	119	18 (7)	4	6	8	18 (5)	7	1	10	12	—	—	12	6	6	11	7
	†120	18 (4)	5	3	10	18 (7)	1	9	8	12 (1)	—	1	11	2	10	6	13
	121	3 (3)	—	3	—	4 (2)	3	—	1	0	—	—	—	2	3	3	3
	122	18 (7)	9	2	7	18 (4)	7	3	8	9 (1)	1	—	8	11	1	17	5
	123	18 (9)	10	5	3	18 (3)	7	2	9	8	1	—	7	8	4	18	7
	124	10 (8)	7	3	—	7 (4)	2	4	1	3	—	—	3	7	5	9	7
	125	16 (9)	8	4	4	18 (3)	2	6	10	12	—	—	12	8	4	10	10
	†126	15 (6)	3	5	7	18 (6)	2	4	12	12	—	—	12	5	7	5	9
Carried forward .		1995 (721)	789	543	663	1910 (643)	510	656	744	1074 (86)	124	183	767	754	693	1428	1384

* One plant died.

	No. of Culture.	Plants at pricking-out time. Vigorous. Total.	Vigorous. Double.	Vigorous. Single.	Vigorous. Failed.	Medium. Total.	Medium. Double.	Medium. Single.	Medium. Failed.	Weak. Total.	Weak. Double.	Weak. Single.	Weak. Failed.	12 most vigorous plants at potting time. Double.	12 most vigorous plants at potting time. Single.	Total doubles.	Total singles.
Brought forward .		1995 (721)	789	543	663	1910 (643)	510	656	744	1074 (86)	124	183	767	754	693	1428	1384
	127	18 (7)	5	1	12*	12 (4)	2	3	7	9 (1)	—	1	8	7	4	7	5
	128	18 (9)	7	4	7	12 (3)	4	1	7	12	—	—	12	7	5	11	5
	129	12 (2)	2	2	8	18 (7)	4	5	9	12 (3)	1	2	9	4	8	7	9
	†130	12 (7)	—	10	2	6 (4)	1	4	1	3 (1)	—	3	—	1	11	1	17
	131	18 (6)	9	5	4	18 (6)	6	4	8	12	—	—	12	5	7	15	9
	132	16 (8)	9	7	—	18 (4)	6	2	10	10	—	—	10	9	3	15	9
	133	18 (7)	11	6	1	12 (4)	6	4	2	10 (1)	4	1	5	11	1	21	11
	134	12 (4)	7	5	—	16 (8)	7	9	—	12	4	—	8	8	4	18	14
	135	15 (5)	7	4	4	18 (6)	8	9	1*	12 (1)	6	5	1	6	6	21	18
	136	18 (6)	12	1	5	18 (5)	4	3	11	12	—	—	12	7	4	16	4
	137	18 (9)	10	3	5	18 (3)	6	4	8	12	—	—	12	9	3	16	7
	†138	12 (7)	2	6	4	12 (3)	1	8	3	12 (2)	—	3	9	3	9	3	17
	139	13 (4)	7	6	—	17 (7)	12	3	2	10 (1)	1	1	8	8	4	20	10
	140	18 (6)	8	5	5	17 (6)	7	5	5	8	2	1	5	9	3	17	11
	141	15 (5)	3	5	7	18 (5)	5	3	10	12 (2)	2	1	9	4	8	10	9
	142	18 (6)	11	6	1	18 (5)	11	4	3	12 (1)	3	4	5	7	5	25	14
	144	12 (6)	7	3	2	8 (3)	4	3	1	5 (3)	4	—	1	9	3	15	6
	145	12 (4)	3	7	2	18 (8)	5	7	6*	12	3	2	7	3	8	11	16
	146	4 (1)	4	—	—	12 (8)	3	5	4	8 (3)	4	3	1	7	5	11	8
	147	18 (5)	8	3	7	18 (6)	7	5	6	12 (1)	3	1	8	9	3	18	9
	148	18 (5)	8	5	5	12 (6)	4	6	2	8 (1)	1	1	6	7	5	13	12
	†149	18 (4)	1	12	5	18 (6)	2	13	2*	10 (2)	1	4	4*	3	9	4	29
	†150	15 (7)	3	12	—	18 (5)	—	15	3	12	5	3	4	—	12	8	30
	151	12 (5)	5	1	6	11 (6)	5	2	4	3 (1)	1	1	1	8	4	11	4
	152	18 (8)	13	4	1	18 (4)	2	4	2	12	1	5	6	10	2	26	13
	153	14 (7)	4	4	6	6 (4)	3	1	2	4 (1)	1	—	3	8	4	8	5
	154	18 (4)	2	3	13	18 (6)	4	4	10	6 (2)	2	1	3	7	5	8	8
	155	18 (9)	10	6	2	18 (3)	6	10	2	6	1	4	1	9	3	17	20
	156	16 (7)	13	2	1	18 (5)	7	7	4	1	—	1	—	11	1	20	10

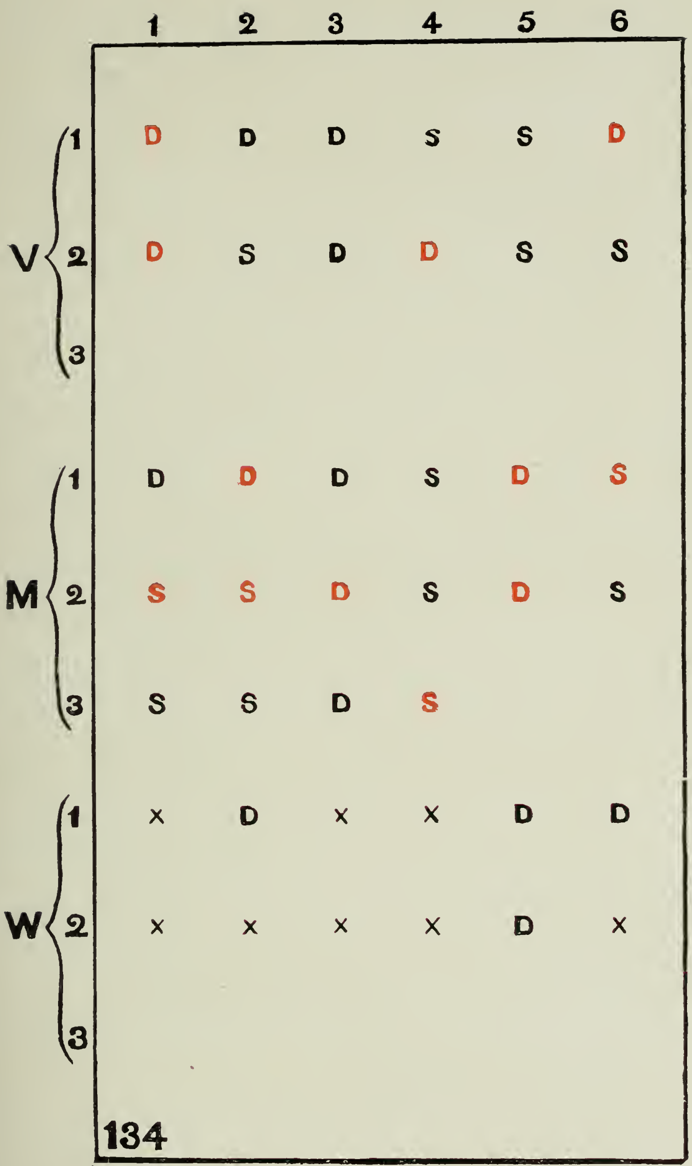

FIG. 22.—DIAGRAM SHOWING ARRANGEMENT OF SEEDLINGS IN BOXES ON PRICKING OUT.

[To face p. 80.

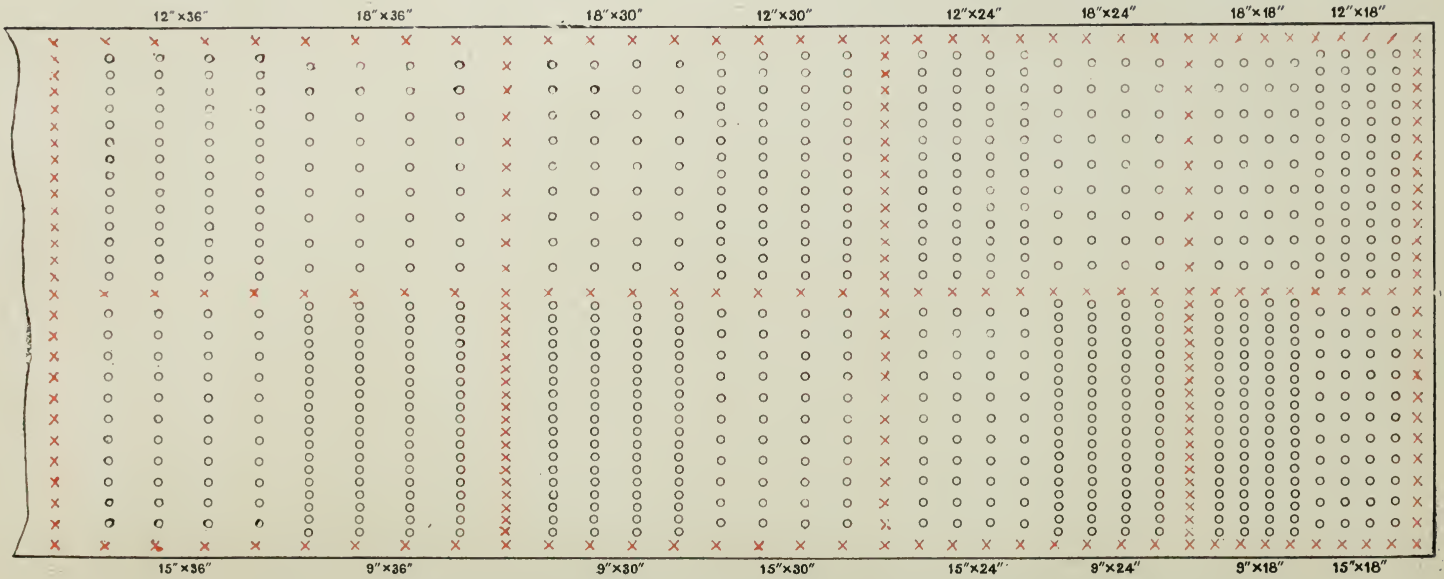

FIG. 23.—PLAN OF ONE-THIRD OF POTATO-SPACING EXPERIMENT. THE PLOTS WERE REPEATED THREE TIMES.

[*To face p.* 81.

157	18 (7)	12	3	3	18 (4)	6	5	7	12 (1)	1	—	11	8	4	19	8
158	18 (4)	4	3	11	18 (8)	6	9	3	12	3	2	7	6	6	13	14
159	—	—	—	—	—	—	—	—	—	—	—	—	2	—	2	—
160	18 (5)	10	2	6	18 (4)	4	2	12	12 (3)	1	3	8	7	5	15	7
161	18 (6)	6	5	7	18 (6)	4	5	9	6	—	2	4	7	5	10	12
162	18 (9)	8	4	6	18 (2)	2	1	15	12 (1)	1	—	11	8	4	11	5
†163	18 (4)	4	5	9*	18 (6)	3	8	7	12 (1)	—	2	10	4	7	7	15
164	18 (8)	10	4	4	4 (3)	2	2	—	6 (1)	1	2	3	8	4	13	8
165	18 (10)	11	3	4	18 (2)	7	2	9	6	—	1	5	9	3	18	6
166	9 (7)	6	1	2	12 (4)	2	2	8	12 (1)	—	1	11	8	4	8	4
167	10 (3)	6	3	1	14 (8)	8	3	3	12 (1)	2	1	9	8	4	16	7
168	15 (7)	5	3	7	18 (5)	6	4	8	12	1	—	11	8	4	12	7
†169	18 (9)	4	9	5	12 (3)	1	5	6	12	—	1	11	3	9	5	15
170	18 (10)	12	6	—	3 (1)	1	1	1	1 (1)	—	1	—	6	6	13	8
171	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	1
172	18 (8)	8	3	7	7 (4)	3	4	—	0	—	—	—	7	5	11	7
173	18 (8)	5	5	8	18 (4)	4	1	13	9	1	2	6	8	4	10	8
174	18 (6)	9	2	7	18 (6)	7	2	9	6	1	—	5	9	3	17	4
175	18 (5)	9	2	7	18 (6)	3	5	10*	12 (1)	2	—	10	7	4	14	7
176	18 (8)	6	5	7	18 (2)	4	1	13	3	—	—	3	7	3	10	6
†177	18 (2)	1	2	15	18 (8)	3	7	8	12 (2)	1	1	10	5	7	5	10
178	18 (6)	7	2	9	12 (6)	4	4	4	12	—	—	12	7	5	11	6
179	18 (9)	9	2	7	18 (3)	5	2	11	12	—	—	12	9	3	14	4
†180	18 (8)	3	7	8	3 (3)	1	2	—	4 (1)	—	1	3	4	8	4	10
Total	2815 (1040)	1135	762	918	2670 (891)	748	886	1036	1540 (127)	189	251	1100	1106	950	2080	1902
No. of plants in strains containing few doubles.	618	98	329	191	663	98	345	196	342	26	105	211	100	384	222	779
No. of plants in good strains .	2197	1037	433	727	2011	650	541	840	1198	163	146	889	1006	566	1858	1123
Percentage of doubles	70·5				59·5				53				64		62	

* One plant died.

vigorous, medium, and weak growth respectively in each culture, and the numbers of singles, doubles, failures, and deaths in each category, as well as the numbers of singles and doubles among the (usually) twelve plants most vigorous at potting time.

One hundred and eighty lots of seeds were sown. One (No. 143) failed to germinate. Four others (Nos. 11, 79, 159, and 171) gave but twelve seedlings between them and were not pricked out. The remainder, 6024 seedlings, were pricked out, and 2056 were potted on.

As the table shows, at pricking-out time 2814 seedlings were classed as vigorous, 2670 as medium, 1540 as weak; but the final figures for flowering showed that there were a number of strains throwing a large proportion of singles, *i.e.*, not good strains of double stocks (marked † in the table), and if we ignore these we have at pricking-out time 2197 vigorous, 2011 medium, and 1198 weak seedlings. It is unfortunate that the conditions in the pricking-out boxes, where the plants not selected for potting-on were allowed to remain, did not permit all to flower, but of the vigorous ones, whether in pots or boxes, that flowered, 1037 plants, or 70·3 per cent., were double, of the medium 650, or 59·5 per cent., of the weak 163, or 53 per cent.

These figures therefore confirm in every way the suggestion Miss SAUNDERS brought forward, as indeed do the figures for the plants potted on, which all flowered, giving 1006 doubles, or 64 per cent., while the less vigorous ones at potting time gave only 60 per cent.

The general high average of doubles among the flowering plants (62 per cent.) suggests that the number of singles among those that failed to flower would have been much higher than these figures show, and it is to be noted that the weak plants at pricking-out time were the worst in flowering in the boxes, for while the failures among the originally vigorous left in the boxes amounted to 51·8 per cent., and among the medium 60 per cent., those among the weak were 84 per cent.

Miss SAUNDERS' observation that selection of the more vigorous seedlings in a good strain of double stocks gives a higher proportion of doubles than the strain as a whole will give is therefore borne out by these observations, and the figures also suggest that the selection is best made at the time of pricking out, rather than later when the plants have attained a larger size, for the proportion of doubles among the selections made then is much greater than among the selections made when the plants were potted on.

It will be seen also that even in the poor strains the tendency of the early-vigorous seedlings is in the same direction.

SOME FURTHER EXPERIMENTS WITH POTATOS.

By J. Wilson and F. J. Chittenden, F.L.S., V.M.H.

I.—Effect of Spacing on Yield.

In Vol. 43, p. 127 of this Journal we published an account of an endeavour made at Wisley in 1917 to ascertain the effect of allowing greater or less space for the development of the individual potato plant whether in the rows or between the rows. The conclusions drawn were "that, within the limits of spacing used" in the series then reported upon:

"1. The greater the space given to the individual plant the greater the yield of that individual is likely to be.

"2. The greater the number of plants on a given area the greater the yield from that area will be."

There were nine different spacings in the series in 1917, viz. 2 feet, 2 feet 6 inches, and 3 feet between the rows, and 12 inches, 15 inches, and 18 inches between the plants.

A somewhat similar series was laid down in 1918, but extended in both directions, *i.e.*, in addition to the spacing given in 1917, both closer and wider spacing were given. The series was 18 inches, 24 inches, 30 inches, and 36 inches between the rows, and for each different distance 9 inches, 12 inches, 15 inches, and 18 inches between the plants in the rows. There were thus 16 different spacings instead of 9 as in 1917, there was in addition a plot of nine rows of potatos planted three feet apart each way.

Each different spacing occupied a plot 15 feet long and just wide enough to accommodate four rows. The plots of the different spacings were thus of equal length but of varying width. The different plots were outlined by the variety 'Factor,' planted so that the rows of 'Arran Chief' with which the experiment was conducted each had its proper space on each side of it, the spaces on both sides of any row of 'Arran Chief' being the same on each plot. The arrangement also insured that the end plants of each row had the same space on each side of them as the middle plants. We have drawn attention in another place (see p. 74) to the importance of ensuring that all the plants in any one plot in an experimental planting have precisely the same spacing, and this was arranged for in this series. The plan (fig. 23) shows the arrangement of the plants in one-third of the experiment, the 'Factors' being shown in red, the 'Arran Chiefs' in black.

Each spacing was repeated three times in different parts of the ground, in order to minimize the influence of differences in soil which are liable to interfere with experiments even when they are carried out on apparently uniform soil within a small area.

The variety grown was 'Arran Chief,' a variety of vigorous growth, making tall tops, but fairly resistant at present to the common potato

POTATO SPACING EXPERIMENTS. SQ. ROD YIELDS COMPARED.

Spacing	18″ × 9″	18″ × 12″	18″ × 15″	18″ × 18″
Area each plant	1⅛ sq. ft.	1½ sq. ft.	1⅞ sq. ft.	2¼ sq. ft.
	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Ware and seed	273 6	279 8	252 8	225 4
Chats	41 2	28 6	32 9	19 13
Total	314 8	307 14	285 1	245 1
Aver. yield	1 4¾	1 11	1 15¾	2 0½
No. of plants	242	182	145	121
Spacing	24″ × 9″	24″ × 12″	24″ × 15″	24″ × 18″
Area each plant	1½ sq. ft.	2 sq. ft.	2½ sq. ft.	3 sq. ft.
	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Ware and seed	261 0	250 0	251 0	230 8
Chats	43 0	22 0	29 8	17 10
Total	304 0	272 0	280 8	248 2
Aver. yield	1 10½	2 0	2 9	2 11½
No. of plants	182	136	109	91
Spacing	30″ × 9″	30″ × 12″	30″ × 15″	30″ × 18″
Area each plant	1⅞ sq. ft.	2½ sq. ft.	3⅛ sq. ft.	3¾ sq. ft.
	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Ware and seeds	247 10	243 0	225 4	227 8
Chats	32 10	20 8	22 4	15 10
Total	280 4	263 8	247 8	243 2
Aver. yield	1 14¾	2 6½	2 14½	3 5¼
No. of plants	145	109	85	73
Spacing	36″ × 9″	36″ × 12″	36″ × 15″	36″ × 18″
Area each plant	2¼ sq. ft.	3 sq. ft.	3¾ sq. ft.	4½ sq. ft.
	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Ware and seed	232 0	230 4	227 0	216 0
Chats	27 12	21 12	15 6	14 8
Total	259 12	252 0	242 6	230 8
Aver. yield	2 2¼	2 12¼	3 5½	3 12½
No. of plants	121	91	73	61

blight due to *Phytophthora infestans.* The stock had come from Scotland in 1917 and had been grown once at Wisley. The tubers selected for seed were of uniform size (about 3 oz.) and were sprouted in a light place before planting. They were all planted on May 8, 1918, at a uniform depth, and made good growth from start to finish. The contrast between the 'Factors' which outlined the plots and the 'Arran Chiefs' which filled them was striking in the extreme, and made much easier the task of comparing their growth during the season.

The cultural operations were all carried out at the same time, and the crop was lifted and weighed in October after the tops had died down, chats being weighed separately from seed and ware.

The result of each spacing, calculated to a square rod plot both for ware and seed and chats, is shown in the following Table. The area occupied by each plant, the number of plants required to plant a square

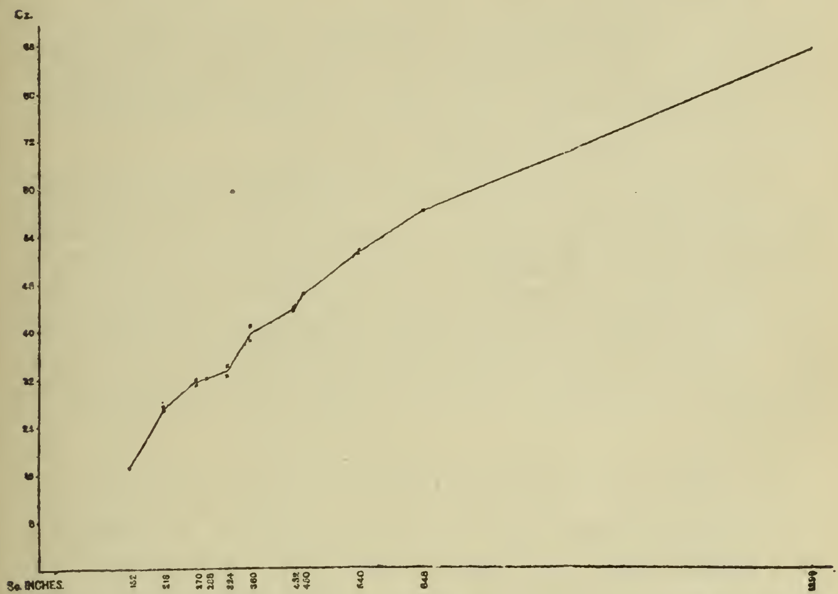

FIG 24.—SHOWING RISE IN AVERAGE YIELD OF POTATOS WITH INCREASE IN SPACE.

rod, and the average weight of crop from each plant of that spacing are also shown in the Table.

In making the calculations for the Table the very rare misses have been allowed for, and all the yields given are averages of the triplicate series.

The plot on which the widest spacing was arranged occurred but once. Eighty-one tubers of the same stock and size as the remainder were planted in nine rows three feet apart, the plants being three feet apart in the rows. Each plant was mounded up all round instead of being earthed up in rows as the remainder were. The total yield was 447 lb. 10 oz., giving 143 lb. 8 oz. ware and seed, 23 lb. 10 oz. chats, and a total of 167 lb. 2 oz. to the square rod, the average yield for a plant being 5 lb. $8\frac{1}{2}$ oz.

The figures here given confirm in a marked way the conclusions stated after last season's experiment, but in translating them into practice two or three other things beside actual yield need to be taken into consideration, the three most important being the relative quantity of seed required, the convenience in cultivating among and earthing up the plants, and the need of a circulation of air as a preventive of disease.

It will be seen that the difference in yield between one plot and another so far as ware and seed potatos go is often scarcely more than the weight of the seed planted. Especially with the nine-inch spacing between the plants there is generally a much higher proportion of chats to ware and seed (compare for instance the crops on the 30 in. × 9 in. spacing with the 30 in. × 12 in., and that again with the 30 in. × 18 in., which proves to be about as economical as the 30 in. × 12 in.). Ir all probability, with a large-topped variety such as 'Arran Chief,' the most remunerative spacing, all things considered, will be somewhere between 2 feet and 2 feet 6 inches between the rows and 15 inches between the plants.

The spacing of a square yard for each plant is clearly too great to give a profitable return, but it is by no means clear that it is beyond the point at which the plant's roots cease to occupy the surrounding ground and to profit by the increased space. The curve given in Fig. 24 shows the gradual and almost regular rise in yield from average plants in the different spacings, the horizontal distance apart of the crosses which represent these average yields representing the relative space given, and the height of the cross above the base line the respective yield.

II.—Effect of Different Origin on Yield of Potatos.

It has long been known that seed-potatos from parts of Scotland and from Ireland tend to give much greater yields, other things being equal, than do those from the middle or most parts of the south of England. This has been repeatedly pointed out in this Journal (see, *e.g.*, vol. xxxiv., p. 538), and is now widely acted upon by large numbers of growers. Figures derived from our trials indicate, however, that not all parts of Scotland are equally good as a source of seed, and confirm a belief quite widely held. The comparative table already referred to shows, for example, that twenty tubers of 'Up-to-Date' from Alloa gave 123 lb., while twenty from Ayrshire gave only 68 lb., and from Kelso 56 lb. Somewhat similar discrepancies are to be found in other seasons and between other localities, and the difference is too large to be of no significance, although only twenty plants are brought into comparison. Other figures in various trials suggest that some parts of England are better than others as sources of seed-potatos, and the district near Moretonhampstead on the edge of Dartmoor appeared to be particularly indicated as a good source in more than one of our recent trials. Arrangements were accordingly made in 1918 to obtain seed tubers of certain varieties from different localities, including the Moretonhampstead district, for comparison with one another. We have to thank Messrs. Cuthbertson of Edinburgh; Farmer of Moretonhampstead; F. Howarth, Water Engineer of Plymouth; Poad of York; Williamson of Mallow, co. Cork; and P. Veitch of Exeter for securing and supplying tubers for this trial.

Forty sprouted tubers of each stock were planted in two rows at 18 inches apart in the rows, the rows being 2 feet 6 inches apart, in April under ordinary cultural conditions. They were sprayed with Burgundy mixture twice, and lifted when the tops had died down. The yields were as follows:

Variety.	Origin of Seed.	Lifted.	Yield of 40 Tubers planted.	
		1918.	lb.	oz.
1. Sharpe's Express	Ireland	September 18	94	7
2. ,,	Moretonhampstead, S. Devon	,,	139	14
3. ,,	Edinburgh	,,	96	1
*4. ,,	Scotland	,,	163	2
*5. Duke of York	Scotland	,, 20	138	14
6. ,,	Moretonhampstead	,, 9	57	10
7. ,,	Edinburgh	,,	45	11
*8. Royal Kidney	Yorkshire	,, 24	168	1
9. ,,	Plymouth	,,	110	4
*10. British Queen	Yorkshire	,, 23	210	7
11. ,,	Moretonhampstead	,,	175	15
12. ,,	Ireland	,,	168	2
13. ,,	Edinburgh	,,	126	6
14. Great Scot	Edinburgh	October 2	140	9
*15. ,,	Yorkshire	,,	173	12
16. ,,	Morchard Bishop, N. Devon	,,	70	13
17. ,,	Moretonhampstead	,,	185	0
34. ,,	Wisley	,, 4	149	11
18. King Edward	Plymouth	,, 3	102	6
*19. ,,	Scotland	,,	186	8
20. ,,	Edinburgh	,,	109	7
21. Arran Chief	Ireland	,, 11	162	4
22. ,,	Moretonhampstead	,,	167	14
23. ,,	Edinburgh	,,	67	4
*24. ,,	Scotland	,,	184	5
25. ,,	Exeter (1 year from Scotland)	,,	110	4
26. ,,	Exeter (3 years from Scotland)	,,	90	8
27. ,,	Newton Poppleford, Devon (2 years from Scotland)	,,	114	5
37. ,,	Wisley	,,	151	7
28. Up-to-Date	Broadclyst, Devon (1 year from Scotland)	,, 4	161	2
29. ,,	Ashburton, Devon (2 years from Scotland)	,,	106	2
30. ,,	Plymouth	,,	162	5
31. ,,	Moretonhampstead	,,	149	11
36. ,,	Wisley	,,	134	15
32. Factor	Edinburgh	,, 7	170	7
38. ,,	Wisley	,, 4	149	14
33. Table Talk	Plymouth	,, 7	161	8

It will be seen that, with the exception of 'Duke of York,' the Moretonhampstead seed compared favourably with that from Scotch and Irish sources. The stocks marked * were a particularly fine sample of seed which had made no attempt to sprout before it reached us to be put into trays, although the season for sprouting was fairly well advanced, and it is doubtless to the treatment the tubers received while in store that a part of their superiority in yield is due. These results, taken with those to which reference has been made already, seem to show the conditions on the edge of Dartmoor near Moreton-hampstead are suitable for the production of almost or quite as good seed as Scotland and Ireland. To have a good situation for growing seed-potatos so near is manifestly desirable to growers in the south, as it reduces the distance the tubers have to be carried by rail and the consequent risks.

Exactly what the conditions necessary for the production of good seed are is still obscure. That the locality alone is sufficient to secure seed which will be certain to produce good crops is clearly unlikely, for the crops produced by the seed from Edinburgh, as shown by the foregoing Table, were in 1918 much below the average from that source. Probably a combination of certain weather and soil conditions are most important, especially perhaps equable conditions of moisture and temperature in the soil during the growth and maturation of the tubers. The power of giving increased yield is usually ascribed to immaturity of the crop at lifting time, and certain experimental results appear to confirm that view, but it seems doubtful whether that is the whole story. It is strange, if immaturity alone is responsible for the power of giving increased yields, that so often the power is still retained by the next vegetative generation, and indeed is often increased. For instance, a Scotch stock of 'Great Scot' gave at Wisley in 1917 from forty tubers 111·2 lb., while forty of the tubers of this stock planted under similar circumstances in 1918, when the general average of potato yields was certainly no higher than in 1917, gave 169¾ lb. It is at any rate clear that the whole of the factors that make for maximum yields of potatos are not yet known, although, speaking in general terms, the source of the seed is one of the most important of them.

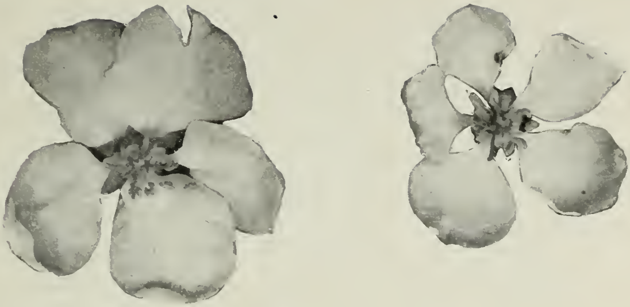

Fig. 25.—Paradise Stocks. Two Types of Flowers.
Type VI. (large petals) and Type VIII. (small petals).

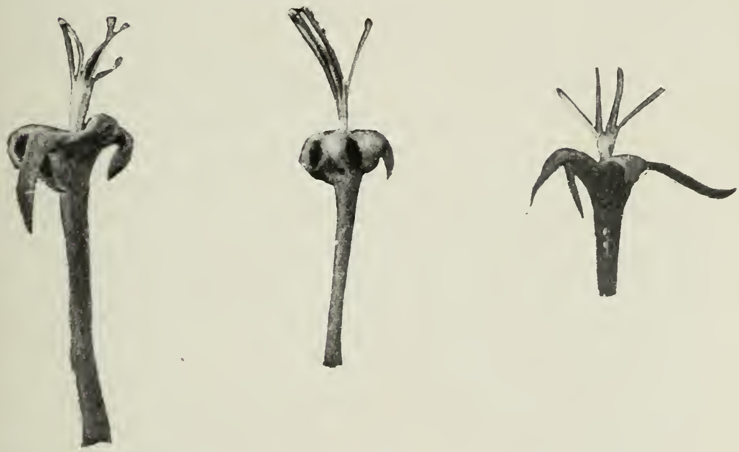

Fig. 26.—Paradise Stocks. Pistils of Flowers.
Showing style fused about one-half (Type II.),
Style fused about one-third (Type VIII.),
Style fused about one-third with branches expanded (Type VI.).

[To face p. 88.

Fig. 27.—Fruit of Paradise Stock, Type II., 'Doucin.'

Fig. 28.—Fruit of Paradise Stock, Type III. (possibly Dutch 'Doucin,' our 'Hollyleaf').

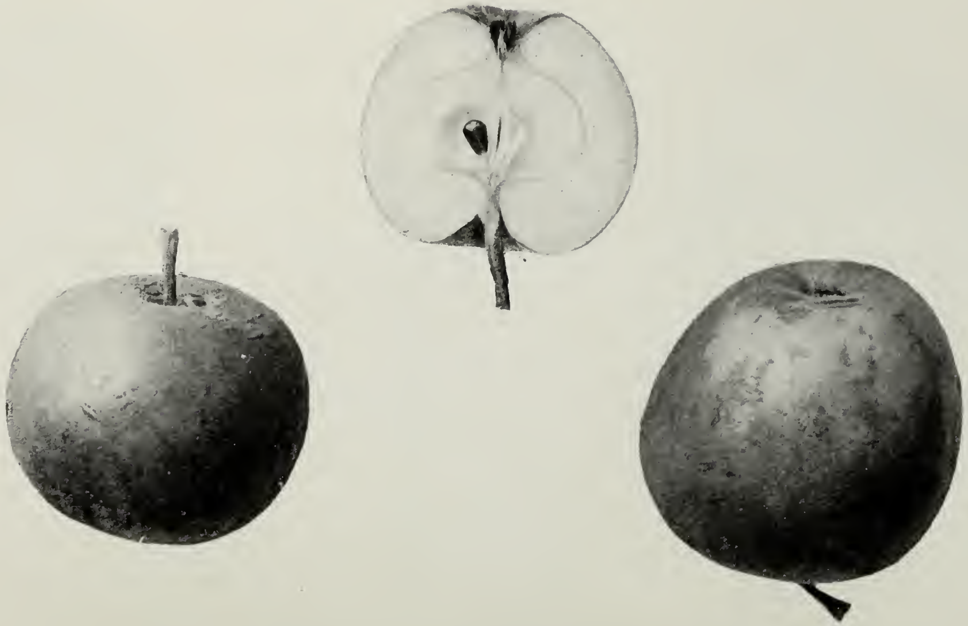

Fig. 29.—Paradise Stock, Type IV. (probably Malus Pumila).

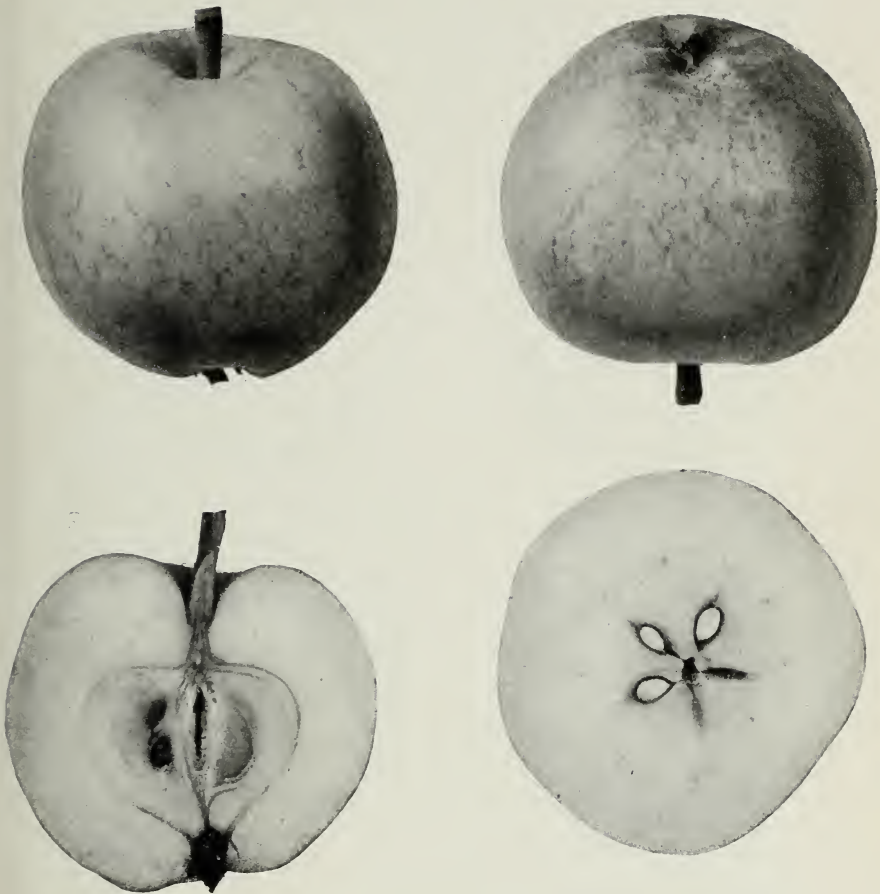

FIG. 30.—FRUIT OF PARADISE STOCK, TYPE VI., 'NONSUCH.'

Fig. 31.—Fruit of Paradise Stock, Type VII. (unidentified).

Fig. 32.—Fruit of Paradise Stock, Type VIII., 'French Paradise.'

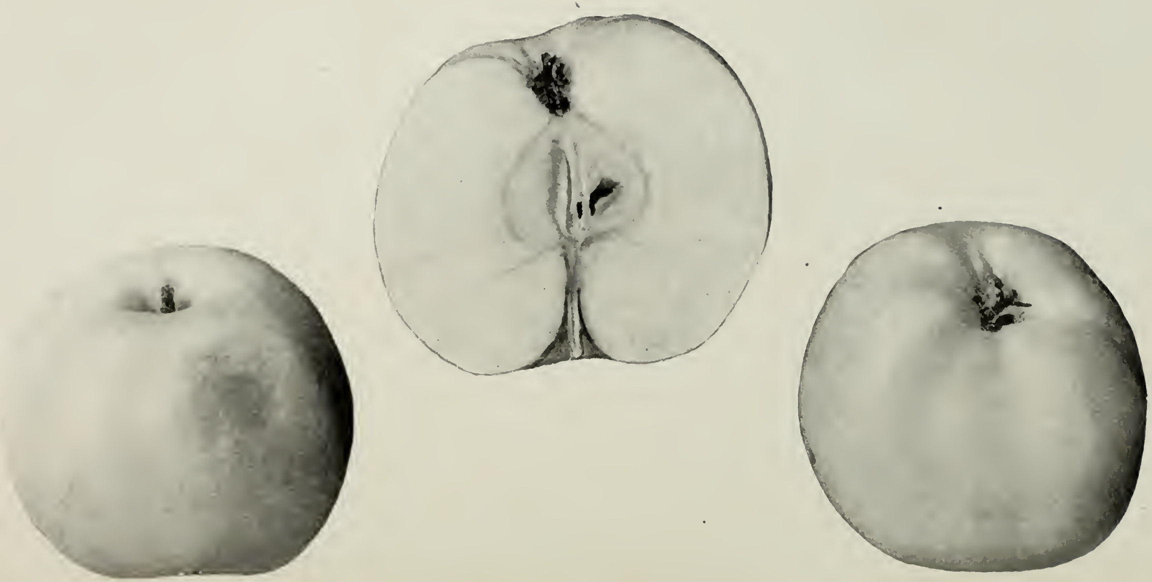

FIG. 33.—FRUIT OF PARADISE STOCK, TYPE IX., 'JAUNE DE METZ PARADISE.'

[To face p. 89.

PARADISE APPLE STOCKS: THEIR FRUIT AND BLOSSOM DESCRIBED.

By Ronald G. Hatton, M.A.
(Director of Wye College Fruit Experiment Station, East Malling.)

It is now six years since the various types of Paradise Stock described in our first report in this Journal * were planted out on their own roots and trained as cordons. The object of so doing was not only to observe their strength of growth, but to test their precocity, and if possible to obtain early bloom and fruit to aid us in the work of identification and classification.

As has already been shown, the characteristics of wood growth, foliage and even rooting habit are sufficient and easy guides to identification for any eye possessing an elementary capacity for seeing botanical differences. At the same time, in order to supplement and complete the work of classification, the present notes and photographs should be of interest and permanent value as a record to the pomologist, and the additional notes with regard to precocity in fruiting and cleanness of fruit may afford some guide in the practical selection of the various types of Paradise Stock for special purposes.

Since the issue of our first report on this subject a considerable amount of knowledge has been accumulated with regard to the adaptability of the various Paradise types to different methods of propagation. Their habits of growth and root systems have been under close observation, and it has been possible to give some indication as to the suitability of each type for a particular purpose. These forecasts have recently been summarized and published for the immediate use and guidance of growers in three of the weekly journals of gardening and fruit-growing, so that it is unnecessary to enlarge upon them here.† It is, however, worth recording that the so-called Paradise Apple Stocks are now generally recognized by the nursery trade as falling into distinct types, and that an important conference of nurserymen held at this station in October 1918 definitely decided to adopt a common nomenclature and to take active measures to put the question of apple stocks upon an altogether sounder footing. We may confidently predict that within a few years the fruit tree buyer will be in a position to order his apple trees upon stocks guaranteed true to name and uniform in quality.

The inquiries into the types of Paradise Apple Stock have emphasized the fact that there is in reality no strict dividing line between the so-called 'Paradise' or 'Dwarfing' stocks and the

* *Jour. R.H.S.* vol. xlii. pp. 361–99.

† This summary is now being issued in leaflet form and can be obtained in due course from this station.

so-called 'Free' or 'Crab' stocks for standard apple trees. The publication of the report of progress made in the researches on free stocks at Long Ashton by Professor B. T. P. Barker, M.A., and G. T. Spinks, B.A. (see *Journal R.H.S.* xliii. p. 546), enforces the same conclusion. There is, in fact, a long series of types in these varying from the root system almost entirely composed of small fibres, to that which consists mainly of three or four coarse fangy roots. Our Paradise Types III. (possibly 'Dutch Doucin') and V. ('Improved Doucin') approximate to the purely fibrous type, whilst Type II. ('Doucin' commonly called 'English Paradise') comes at the other end of the series.

At this station we have also had a number of free stocks under observation for the past six years, and a similar complete series of root systems could be selected from these. They would so provide anything from an exaggerated dwarf up to a vigorous standard tree. At the extreme ends of any such series both the "all fibre" system and the "few coarse fangy roots" produce dwarfing growth, but it would nevertheless be possible to select a series of stocks capable of being propagated vegetatively, and consequently always true to type and therefore uniform, which would suit every requirement from the garden dwarf to the orchard standard. Several of our stronger Paradise types such as Types XIII. and XVI. are readily propagated from layers or cuttings, yet they appear very strong in growth and to possess an anchorage in the ground sufficient for any orchard tree.

The apple stock problem should therefore be nearer a solution as regards the free stocks as well as the dwarfing stocks than might at present be supposed. There is no doubt that a great deal of work yet remains to be done in the selection of the best types to resist disease, and to suit particular soils, and the best methods of propagation; it may even be necessary to breed new types in order to obtain the very best results. In the meantime it should be possible to select out of the collections at Bristol and East Malling a satisfactory series of stocks that will do much to give increased uniformity and health to every class of apple tree.

Though botanical descriptions of the blossom and fruit of a Paradise Stock may appear to be somewhat abstruse, yet the work of classification in itself opens up a wide field for practical advance. The pomologist should take his proper place as an essential link in the chain connecting up fruit research work with economic progress. There should be a far stricter and more systematic record kept of 'varietal' difference than is at present the case.

The following descriptions of fruit of the various types of Paradise Apple Stocks is compiled from notes taken by Mr. J. Amos and myself from young trees on their own roots, planted in February 1913 and trained as single cordons. These cordons, however, have never been very severely pruned because we were anxious to obtain a few specimen fruits as soon as possible.

I think after several seasons we can fairly claim to have got characteristic fruits, though of course we have not yet had fruit in such quantities as to be able to speak very definitely about their average size. However, we are encouraged to publish the present details in the hope that they may serve as a permanent record and aid in the identification of our present types with those used in the past, for some of which good descriptions are still to be found, especially in foreign pomologies. This identification would be of considerable historic interest.

Type I. (Broad-leaved 'English Paradise').

This type has not bloomed during the five seasons since it was planted. It is undoubtedly one of the most vigorous of the Paradise types in common use and is therefore probably naturally less precocious in fruiting. This does not in any way mean that it is not a good commercial grower's stock.

Type II. ('Doucin,' commonly called 'English Paradise').

This type has so far fruited but shyly. It had no blossom before 1917, but it set fruit both in that season and in 1918.

Flowers.*

Flowering Season.	In full blossom about middle of May.
Petals. . .	Large, broad, pinkish, cupped.
Calyx. . .	Very hairy.
Pistil. . .	Longer than stamens.
Style. . .	Fused about half way. Very hairy where fused, slightly hairy below, hairless above fusion.

Fruit (Fig. 27).

Size. . .	Medium (so far the largest of Paradise types).
Form. . .	Regular, roundish, broader than high.
Colour. . .	Yellow green, red cheek towards sun, many small reddish dots.
Skin. . .	Tough, smooth.
Basin. . .	Only slight depression, eye partially closed, sepals long and prominent.
Stalk. . .	Medium to short, in shallow cavity.
Core.† . .	Large, outline indefinite, elliptical, centre closed.
Flesh. . .	Greeny white, very crisp, juicy, acid.
Season. . .	Would probably keep fairly late.

Type III. (possibly 'Dutch Doucin,' our 'Holly Leaf').

This type is distinctly precocious in maturing. It fruited fairly heavily in 1917 and 1918.

Flowers.

Flowering Season.	Later than II. Full blossom towards end of May.
Flowers. . .	Medium size.
Petals. . .	Medium to small, whitish pink, flattish, margins turned back, very hairy on upper surface.

* These flower descriptions only deal with the most salient points of difference. We have followed closely on the lines suggested by Mr. E. A. Bunyard in his article on "Flowers as an aid in identifying Varieties," *Journal R.H.S.* vol. xxxviii. p. 234.

† The descriptions of the outline of the core are taken from central vertical sections through the fruit, as shown in all the illustrations.

Calyx. . .	Hairy.
Pistil. . .	Longer than stamens.
Style. . .	Fused about half way, hairy where fused right to base, slightly hairy above.

FRUIT (FIG. 28).

Size. . .	Medium.
Form. . .	Irregular, one side higher than the other, almost five-sided, ribbed, narrowing towards base.
Colour. . .	Light yellow green, streaked and splashed pink, many small russety dots.
Skin. . .	Medium tough, greasy, much black spot.
Basin. . .	Slightly sunk, eye closed, sepals somewhat long.
Stalk. . .	Very long and slender, medium deep cavity.
Core.* . .	Smallish, outline elliptical, centre partially open.
Flesh. . .	Woolly, similar to Type VIII., only later, 'bitter sweet,' very strong aroma.
Season. . .	Ripe middle September.

TYPE IV. (PROBABLY 'M. PUMILA').

This type is very precocious. It flowered in 1917 and 1918 and fruited heavily.

FLOWERS.

Flowering Season.	Early, blossoms open early in May.
Flowers. . .	Smallish.
Petals. . .	Small, with noticeably long claw, pinkish, cupped.
Calyx. . .	Very hairy.
Pistil. . .	Usually shorter than stamens.
Style. . .	Fused about one third to half way, hairy where fused.

FRUIT (FIG. 29).

Size.	Small.
Form. . .	Very regular, roundish, slightly longer than broad.
Colour. . .	Lightish yellow green in shade, bronzed towards sun, with reddish patches.
Skin. . .	Rough, covered with fine russety markings and small cracks.
Basin. . .	Regular, somewhat deep, eye partially closed.
Stalk. . .	Long, somewhat slight, medium cavity.
Core.* . .	Closed.
Flesh. . .	Crisp, very sweet, yellowish.
Season. . .	Ripe September.

TYPE V. ('IMPROVED DOUCIN' OR 'DOUCIN AMÉLIORÉ').

This type, contrary to expectation, fruited for the first time in 1918, and then only poorly.

FLOWERS.

Flowering Season.	Medium, in full bloom middle of May.
Flowers. . .	Medium to small.
Petals. . .	Medium, limb noticeably longer than broad, pinkish, flattish.
Calyx. . .	Very hairy.
Pistil. . .	Longer than stamens.
Style. . .	Only fused towards base, slightly hairy at base.

* The descriptions of the outline of the core are taken from central vertical sections through the fruit, as shown in all the illustrations.

FRUIT.

(Only two misshapen fruits available.)

Size. . .	Probably medium to small.
Form. . .	Roundish, broader than high, somewhat similar to Type II. 'Doucin.'
Colour. . .	Yellow green, dotted with red, white and russety dots, red cheek towards sun.
Skin. . .	Tough, shiny.
Basin. . .	Medium, eye partially closed, sepals prominent.
Stalk. . .	Medium length and stoutness. Cavity medium to shallow.
Flesh. . .	Crisp, greeny white, very acid.
Season. . .	Probably that of Type II.

TYPE IV. ('NONSUCH PARADISE').

This type shows considerable vigour, but appears more early-maturing than Type I. It blossomed in 1916, 1917, and 1918, but only set a few fruits in 1918.

FLOWERS.

Flowering Season.	Somewhat early in May.
Flowers. . .	The largest of Paradise types.
Petals. . .	Large and limb very broad, often broader than long, almost white.
Calyx. . .	Hairy.
Pistil. . .	Usually equal length with stamens.
Style. . .	Fused at base, styles expanding from point of fusion, very hairy where fused, hairless below and above.

FRUIT (FIG. 30).

Size. . .	Medium.
Form. . .	Slightly taller than broad, five-sided, very distinct ribs, sides slightly flattened.
Colour. . .	Light pea-green to yellow-green, blotched and streaked with russety markings and small pink dots.
Skin. . .	Roughish.
Basin. . .	Irregular shallow basin formed by ribs, giving knuckled appearance, eye closed.
Stalk. . .	Medium to long and stout; cavity somewhat deep and regular.
Core. . .	Large, outline cordate, centre open.
Flesh. . .	Greeny-white, woolly, bitter.

TYPE VII. (UNIDENTIFIED, BUT APPARENTLY PURELY AN ENGLISH STOCK).

This type, somewhat of the 'Doucin' in rooting habit, is very vigorous and distinctly slow to mature. It only fruited in 1918, and then shyly.

FLOWERS.

Flowering Season.	Medium, in full bloom about middle of May.
Flowers. . .	Medium size.
Petals. . .	Medium, limb nearly circular, pinkish.
Calyx. . .	Hairy.
Pistil. . .	Equal in length to stamens.
Style. . .	Fused half way, hairy where fused to base.

FRUIT (FIG. 31).

Size. . .	Medium to small.
Form. . .	Slightly Summer Pippin shaped, though more shouldered at eye.

Colour. . .	Yellow-green, scattered prominent white dots, especially round basin, slight pink flush on one cheek.
Skin. . .	Very tough.
Basin. . .	Deep, somewhat knuckled, eye partially open, sepals not prominent.
Stalk. . .	Short, broadening considerably at base in deep cavity.
Core. . .	Medium size, outline cordate, centre partially closed.
Flesh. . .	White, astringent.
Season. . .	Probably keeps late.

Type VIII. ('French Paradise').

This type is certainly very precocious. It has flowered from 1916 onward. It has fruited heavily in 1917 and 1918.

Flowers.

Flowering Season.	Very early, in full bloom beginning of May.
Flowers. . .	Small.
Petals. . .	Small, slightly pink, cupped.
Calyx. . .	Hairy.
Pistil. . .	Longer than stamens.
Style. . .	Only fused about one third, only slightly hairy where fused, smooth above and below.

Fruit (Fig. 32).

Size. . .	Medium to small.
Form. . .	Almost codlin, ribbed, roundish oblong, slightly flattened.
Colour. . .	Yellow, slight pink spots and streaks.
Skin. . .	Smooth and greasy. Much black spot.
Basin. . .	Medium puckered basin, eye closed, long prominent sepals.
Stalk. . .	Slender, often long, swollen at end, cavity medium.
Core. . .	Smallish, outline irregular, roundish, centre closed.
Flesh. . .	Creamy-white, woolly, rough, very sweet, with bitter after-taste.
Season. . .	Ripe in August.

Type IX. ('Jaune de Metz Paradise' or 'Yellow Paradise').

This type is undoubtedly early-maturing, and considerably healthier than Type VIII. on our soil. It was planted a year later than the other types, and started fruiting in 1917. It has fruited heavily.

Flowers.

Flowering Season.	Early in May.
Flowers. . .	Medium to large.
Petals. . .	Medium to large, long claw, pinkish, cupped.
Pistil. . .	Longer than stamens.
Style. . .	Fused half way, whole length very hairy.

Fruit (Fig. 33).

Size. . .	Medium.
Form. . .	Somewhat irregular, codlin-shaped, flattish, ribbed and slightly angular, one side usually higher.
Colour. . .	Light green, turning yellow, spotted with russety dots and streaks, very slight pink blush.
Skin. . .	Tougher than VIII., inclined to be rough.
Basin. . .	Somewhat deep and puckered, frequent 'knobs' at base, eye closed, sepals long, pointed and reflex.
Stalk. . .	Short, slender, usually not protruding below cavity; cavity, deep, narrow.
Core. . .	Small, outline cordate, centre practically closed.
Flesh. . .	Creamy-white, crisp, juicy, sweet but slightly bitter.
Season. . .	Ripe in August.

RUNNER BEANS AT WISLEY, 1918.

SIXTY stocks of runner beans were received for trial in 1918. They were sown in rows 33 feet long, and 6 feet apart, with 9 inches between the seeds, on May 22. Germination was good in nearly all cases, a few seeds missing in Nos. 10, 26, 42, 47, and 59. They made good growth from the start, and, without exception, produced good crops. They were stopped at about 8 feet in height. The soil had not received any manure since 1916, and was simply dug after the preceding crop (peas in part, beet in part) in the spring of 1918. The cultivation of these and other trials reported here were under the charge of Mr. J. Wilson, garden foreman.

The Runner Bean is derived from *Phaseolus multiflorus*, and has long been cultivated, giving rise to a considerable number of named forms. The principal variations are in height, and in colour of flower and seed, but, in addition to this, continued selection has given strains producing very long, broad, straight, flat pods, and has increased the cropping capacity by perhaps 50 per cent., while a certain amount of variation is to be seen in the texture of the pod, the thickness of its flesh, its toughness as it ages, and so on. In many cases distinctive names have been given to these improved forms, but they need constant selection in order to maintain the standard of excellence, and in many cases are rather to be looked upon as strains than distinct varieties. An attempt has been made to group together the strains in the trial bearing most resemblance to one another, but the lines of demarcation are by no means clear. There is, however, in the scarlet-flowered section on the whole a gradual rise from the shorter to the longer podded strains, and an improvement in the straightness and flatness of the pods. It must not, however, be thought that the shorter podded forms have lost their value in the garden, and especially in the market garden, for short pods when packed travel with much less damage than the long, and the Judging Committee, recognizing this, recommended awards to certain strains for this purpose. These are noted in the descriptions.

The Judging Committee inspected the Runner Beans on August 22, and made the following recommendations:

First Class Certificate.

28. Prizewinner, sent by Messrs. Dickson & Robinson.

Award of Merit.

14. A1, sent by Messrs. Sutton.
24. Scarlet Runner, sent by Messrs. Sutton.
*35. Scarlet Emperor, sent by Messrs. Carter.

* These awards were made for special fitness for market purposes.

Highly Commended.

33. Best of All, sent by Messrs. Dickson & Robinson.
8. Champion Runner, sent by Messrs. Dobbie.
*4. Champion Scarlet, sent by Messrs. Barr.
39. Giant Exhibition, sent by Messrs. Dickson & Robinson.
*1, 2. Hollington Dwarf, sent by Messrs. Barr, and Cooper Taber.
42. Improved Painted Lady, sent by Messrs. Sutton.
43. Mikado, sent by Messrs. Barr.
17. Red Giant, sent by Messrs. Carter.
*37. Scarlet Emperor, sent by Messrs. Sydenham.
49. The Czar, sent by Messrs. R. Veitch.

Commended.

30. Best of All, sent by Messrs. Sutton.

Of the foregoing, forms under the same names had received awards in earlier trials, as follows:

A1 (**A.M.** when shown by Messrs. Sutton in 1895); Best of All (**A.M.** when shown by Messrs. Sutton in 1903); Champion Runner (**A.M.** when shown by Messrs. Dobbie in 1903); Prizewinner (**F.C.C.** when shown by Messrs. Sutton in 1892).

Hackwood Success (**A.M.** 1903) and Hill's Prize (**F.C.C.**) were also represented in the trial, but were this year passed over by the Committee.

VARIETIES.†

1.	Hollington Dwarf.	31.	Best of All.
2.	,, ,,	32.	,, ,, ,,
3.	Hundredfold.	33.	,, ,, ,,
4.	Champion Scarlet.	34.	Scarlet Emperor.
5.	Neal's Ne Plus Ultra.	35.	,, ,,
6.	,, ,, ,, ,,	36.	,, ,,
7.	,, ,, ,, ,,	37.	,, ,,
8.	Champion Runner.	38.	Conqueror.
9.	Hackwood Park Success.	39.	Giant Exhibition.
10.	,, ,, ,,	40.	Exhibition.
11.	Trellis Giant.	41.	Painted Lady.
12.	Wiltshire Giant.	42.	Improved Painted Lady.
13.	Scarlet Runner Pole.	43.	Mikado.
14.	A1.	44.	Giantess.
15.	,,	45.	The Marvel.
16.	Hill's Prize.	46.	Sharpe's Beauty.
17.	Red Giant.	47.	Haricot à Espagne blanc.
18.	,, ,,	48.	The Czar.
19.	,, ,, re-selected.	49.	,, ,,
20.	Mammoth.	50.	Mammoth White.
21.	Titan.	51.	Giant White Runner.
22.	Invicta.	52.	,, ,, ,,
23.	King of Runners.	53.	,, ,, ,,
24.	Scarlet.	54.	Jubilee.
25.	Excelsior.	55.	Large White.
26.	Prizewinner.	56.	White Emperor.
27.	,,	57.	Emperor White.
28.	,,	58.	Spencer's White.
29.	,,	59.	White Monarch.
30.	Best of All.	60.	Southampton White Runner.

* These awards were made for special fitness for market purposes.

† All plants grown for trial in the Wisley Gardens are known by number only until the judging is completed.

Notes and Descriptions.

1. Flowers Scarlet.

a. Plants Dwarfer.

Hollington Dwarf Type.—Height 8 feet; foliage of medium size, dark green; flowers scarlet; pods 3 to 5 in cluster,* about 6 inches long, ⅝ to ¾ inch wide, flat-round, slightly bulged over seeds, with little parchment or string until old, dark green; skin rather rough; flesh thick; ripe seeds small (about 420 to pint).

This type is smaller in all its parts than any other in cultivation, and is perhaps the best for growing on the 'pinching' system without supports. It has been long in cultivation. The short pods are excellent for packing for market without risk of breaking in transit, and this type and Nos. 4 and 35 and 37 were selected by the Committee for commendation for this purpose.

1. Hollington Dwarf (Barr), **XXX** August 22, 1918.—Ready August 14. Crop 81 lb.

2. Hollington Dwarf (Cooper-Taber), **XXX** August 22, 1918. Ready August 14. Crop 95 lb.

3. Hundredfold (Barr).—Ready August 16. Crop 68 lb. Stock not so good as Nos. 1 and 2, but otherwise indistinguishable.

b. Plants Taller (over 8 feet).

(1) Seeds Purple with Black Markings.

Scarlet Champion Type.—Foliage large, dark green; pods 3 to 5 in cluster, 7 inches long, straight or curved, flat, ¾ inch wide, slightly bulged over seeds, with little parchment or string until old, dark green, sometimes tinged red, skin rather rough; flesh thick. Ripe seeds about 300 to pint. Introduced by Messrs. Carter. Another short-podded variety useful for packing for market.

4. Champion Scarlet (Barr), **XXX** August 22, 1918.—Ready August 16. Crop 100 lb.

13. Scarlet Runner Pole (Burpee).—Ready August 16, but on the whole later than 4; a rather more vigorous grower, and pods slightly wider and shorter, but otherwise very much like No. 4. Crop 92 lb.

Ne Plus Ultra Type.—Foliage large, dark green; pods 3 to 5 in a cluster, straight or curved, of medium length, flat, ⅞ inch wide, dark green, often tinged brown, especially along edges, skin rather rough; flesh medium to thick, with little parchment or string till old.

This is an old type of Scarlet Runner, and under it we have grouped a number of forms which were, in our Trials, hardly distinct from No. 7, which we have taken as the type, and which has been growing under our observation every season for many years. It is interesting to note that this stock has thrown from time to time a great many different forms. The forms under different names were probably in many cases improvements in length of pod, &c., upon the original 'Ne Plus Ultra,' but have now reverted (as seen in our Trials) to something very little different from that variety. It will be seen that the size of the ripe seed varies considerably.

5. Neal's Ne Plus Ultra (Barr).—Ready August 14. Pods 6½ to 9 inches. Crop 84 lb. Ripe seed 290 to pint.

6. Neal's Ne Plus Ultra (Sydenham).—Ready August 14. Pods 7½ to 9 inches. Crop 76 lb. Ripe seed 276 to pint. A rather more regular stock than No. 5.

7. Ne Plus Ultra (Chittenden).—Ready August 14. Pods 7 inches. Crop 103 lb. Ripe seed 240 to pint.

9. Hackwood Success (Barr).—Ready August 14. Pods 3 or 4 in cluster, 7½ to 8 inches long. Crop 63 lb. A more regular stock than No. 7. Seeds 300 to pint.

10. Hackwood Park Success (R. Veitch).—A mixed stock—some white-flowered—some with almost red pods.

11. Trellis Giant (Barr).—Ready August 16. Pods 3 or 4 in cluster, 7½ inches long. Crop 93 lb. Seeds 340 to pint. Some rogues. Not a good stock.

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* The numbers given refer not to the total number of pods starting development in a cluster, but to the number generally matured.

12. Wiltshire Giant (Barr).—Ready August 16. Pods 3 or 4 in cluster, 8 to 9 inches long. Crop 92 lb. Seeds 280 to pint.

15. A1 (Barr).—Ready August 16. Pods 7½ to 9½ inches long. Crop 81 lb. Seeds 320 to pint. Not Sutton's A1 (*q.v.*).

16. Hill's Prize (Barr).—Ready August 16. Pods 7½ to 9½ inches long, mostly straight, ¾ inch wide. Crop 78 lb. Seeds 260 to pint.

17. Red Giant (Barr), **XXX** August 22, 1918.—Ready August 16. Pods 3 or 4 in cluster, 7 to 8 inches long, mostly straight, ¾ inch wide, slightly bulging over seeds. Crop 75 lb., good stock near 'Ne Plus Ultra.' Seed 260 to pint.

18. Red Giant (Carter).—Ready August 14. Pods 3 to 5 in cluster, 7½ to 9 inches long, mostly curved, ¾ inch wide. Crop 88 lb. Seeds 280 to pint. Not quite true.

[Neither 17 nor 18 seems to be typical 'Red Giant,' which was raised by Mr. Wm. Payne of Peasmarsh about 1902, and introduced by Messrs. Carter. It had larger and rougher pods than Scarlet Emperor.]

21. Titan (Barr).—Ready August 14. Pods 3 to 6 in cluster, 8½ inches long, slightly bulging over seeds. Crop 77 lb. Seeds 260 to pint. The correctness of the name is in doubt.

40. Hancock's Exhibition (Thos. Hancock).—Ready August 17. Pods 3 or 4 in cluster, 7½ to 8½ inches long. Crop 93 lb. Seeds 250 to pint. A poor stock.

[Selected by sender from 'Prizewinner' as a dark-seeded form, but see note under that type.]

Ne Plus Ultra Improved Type.—Differs from the foregoing mainly in the length and width of the pod, much greater as a rule than in the old 'Ne Plus Ultra.' Characters as under 'Ne Plus Ultra' except where noted. Flesh of pods thick.

19. Red Giant Reselected (Carter).—Ready August 16. Pods 3 to 5 in cluster, 9 to 11 inches long, mostly straight, ¾ to 1 inch wide, rarely tinged brown. Crop 99 lb. Ripe seeds 230 to pint. Selected from 'Red Giant' by Messrs. Carter.

20. Mammoth (R. Veitch).—Ready August 16. Pods 3 or 4 in cluster, 8 to 9 inches long, straight or curved, ⅞ to 1 inch wide, slightly bulged over seeds. Crop 91 lb. Ripe seed 168 to pint.

24. Scarlet (Sutton), **A.M.** August 22, 1918.—Ready August 16. Pods 3 to 6 in cluster, 9 to 11 inches long, ⅞ inch wide, mostly straight, rough-skinned and dark green, very fleshy. Crop 99 lb. A fine stock with rather narrower pods than No. 19. Selected by senders. Seeds 290 to pint.

25. Excelsior (Dickson & Robinson).—Ready August 16. Pods 3 to 5 in cluster, 8 to 12 inches long, ⅞ inch wide, narrow-shouldered, tinged brown. Crop 108 lb. A good stock, but flowering not quite so close to ground as last. Selected by senders. Seeds 200 to pint.

38. Conqueror (Dickson & Robinson).—Ready August 17. Pods 3 to 4 in cluster, 8½ to 10½ inches long, ¾ inch wide, mostly curved, dark green and rough-skinned. Crop 84 lb. Some white rogues. Seeds 280 to pint. Raised by Mr. Taylor of Byram Park Gardens, introduced by senders.

Invicta Type.—Still near the 'Ne Plus Ultra' type, but pods flatter.

22. Invicta (Bunyard).—Ready August 16. Pods 3 to 5 in cluster, 8 inches long, ¾ to ⅞ inch wide, dark green, rather rough, tinged with brown at edges, bulging slightly over seeds. Crop 83 lb. Seeds 276 to pint. Introduced by senders.

Scarlet Emperor Type.—Intermediate between 'Ne Plus Ultra' and 'Best of All' types. Pods 3 to 5 in cluster, with rather rough surface, and straight, of medium length, and about ¾ inch wide; flesh thick, slightly bulged over seeds, dark green, often brown at edges, and purplish tinged. String of medium toughness. Seeds 240 to pint.

'Scarlet Emperor' was raised by Mr. Lye and introduced by Messrs. Carter in 1905 under the name 'Mammoth Exhibition,' which was changed in 1906 to 'Scarlet Emperor.'

34. Scarlet Emperor (R. Veitch).—Requires further selection. Ready August 16. Crop 90 lb. 2 oz.

35. Scarlet Emperor (Barr), **A.M.** August 22, 1918, as a market variety. Pods about 9 inches long. Crop 96 lb. Ready August 19.

36. Scarlet Emperor (Carter).—Ready August 16. Pods 9 to 10 inches long. Crop 78 lb., a regular stock, but less prolific than last and not cropped near ground.

37. Scarlet Emperor (Sydenham), **XXX** August 22, 1918. Ready August 14. Pods 8 to 9 inches long. Crop 86 lb. A good stock.

39. Giant Exhibition (Dickson & Robinson), **XXX** August 22, 1918.—Ready August 17. Pods 7 to 10½ inches long. Crop 95 lb. A good stock, with pods rather broader and sometimes rather longer than remainder in this section. Introduced by senders.

CHAMPION RUNNER TYPE.—A paler type, both in foliage and pod, than the 'Ne Plus Ultra.' Pods 3 to 5 in cluster, 7 to 8 inches long, mostly straight, ¾ to ⅞ inch wide; flesh thick; string little.

8. Champion Runner (Dobbie), **XXX** August 22, 1918.—Ready August 14. Crop 89 lb. A very good stock. Raised and introduced by senders.

A1 TYPE.—A distinct type, with longer, much broader, and rougher pods than 'Ne Plus Ultra.' Pods 3 to 6 in cluster, 9½ to 11 inches in length, mostly straight, ⅞ to 1⅛ inch in width; some pods containing 8 beans; flesh thick; remaining long without string, and very flat; dark green and somewhat brown at edges.

14. A1 (Sutton), **A.M.** August 22, 1918.—Ready August 14. Crop 93 lb. Raised and introduced by senders.

KING OF RUNNERS TYPE.—Foliage paler, somewhat like 'Champion Runner,' but pods longer and wider, and dark green. Pods 3 to 5 in cluster, 12 (sometimes 14) inches long, straight, ⅞ to 1 inch broad; flesh thick; with little string. Pods rather rough.

23. King of Runners (Dickson & Robinson).—Ready August 16. Crop 89 lb. Raised by senders, but not yet introduced.

BEST OF ALL TYPE.—A heavy cropping variety with long straight flat, dark-green pods, ⅞ inch wide, 3 to 5 in a cluster; thick flesh, and little string. Originally introduced by Messrs. Sutton.

30. Best of All (Sutton), **XX** August 22, 1918.—Ready August 17. Pods 7 to 11 inches long, very straight. Crop 113 lb.

33. Best of All (Dickson & Robinson), **XXX** August 22, 1918.—Ready August 16. Pods longer than in No. 30, of which it is the senders' selection, 9 to 11 (sometimes 13) inches long. Crop 114 lb.

31 and 32 (from Messrs. Veitch and Barr respectively), sent under this name, proved to be nearer 'Scarlet Champion' type, with shorter, narrower, but rounder pods than the true 'Best of All,' and the stocks were mixed.

(2) SEEDS WITH FEW BLACK MARKINGS.

PRIZEWINNER TYPE.—The distinguishing character of this type, first selected and distributed by Messrs. Sutton, is in the colour of the seed. Seeds of this colour occur in many varieties, and the plants do not always breed true, but the best stocks of 'Prizewinner' have been selected from plants with long, straight, dark green, brown at edges, rough-skinned, flat pods. The pods are in clusters of 3 to 6, have thick flesh, and little string.

26. Prizewinner (Sutton).—Ready August 14. Pods 12 to 13 inches long, ⅞ to 1 inch wide. Not fruiting so low as many. Crop 108 lb.

27. Prizewinner (Veitch).—Ready August 14. Smaller in all parts than foregoing. Crop 72 lb.

28. Prizewinner (Dickson & Robinson), **F.C.C.** August 22, 1918.—Ready August 14. Pods 10½ to 12 inches, often in clusters of 6; ⅞ inch wide. Cropping from near ground. A very regular, prolific stock. Crop 114 lb. The senders' selection.

29. Prizewinner (Barr).—Similar to No. 27. Crop 89 lb.

2. FLOWERS SCARLET AND WHITE.

(*a*) *Seeds light dun with dark dun markings.*

PAINTED LADY TYPE.—Characterized by the flower colour, and varying in pod length, seed size, &c. Pods 3 to 5 in cluster, dark green, rather rough.

41. Painted Lady (Barr).—Ready August 17. Pods 9 inches long, ⅞ inch wide, mostly straight, flat, slightly bulged over seeds; flesh medium, string little. Ripe seeds 320 to pint. Crop 94 lb.

42. Improved Painted Lady (Sutton), **XXX** August 22, 1918.—Ready August 17. Pods somewhat longer and wider than No. 41. Flesh thicker. Ripe seed 230 to pint. Crop 82 lb.

43. Mikado (Barr), **XXX** August 22, 1918.—Ready August 19. A very good stock, with somewhat shorter, narrower pods than last, and with no bulging over seeds. Ripe seed 320 to pint. Crop 85 lb.

44. Giantess (Barr) and 45, Marvel (Barr), were practically indistinguishable from No. 41, though the pods were perhaps a little shorter. The seeds of 'Giantess' (280 to pint) were larger than of 'Marvel' (350 to pint). The latter was said to be a dwarf selection, but was as tall and vigorous as other stocks. Crops 74 lb. and 109 lb. respectively.

(*b*) *Seeds light dun with few black markings.*

Sharpe's Beauty Type.—Quite distinct in the colour of the seeds.

46. Sharpe's Beauty (Wisley).—Dark green, vigorous. Pods 3 to 5 in cluster, 7 to 8 inches long, straight, $\frac{7}{8}$ inch wide, dark green and rough-skinned; with little string; slightly bulged over seeds. Not fruited so near ground as some. Seeds 280 to pint. Ripe crop 91 lb.

3. Flowers white, seeds white.

White Dutch Type.—The short-podded white runner. Pods 3 to 5 in cluster, more or less straight, 6 to 7 inches long, $\frac{7}{8}$ inch broad, dark green; flesh thick; string little till old.

47. Haricot d'Espagne blanc (Vilmorin).—An excellent stock of the 'White Dutch' type, ready August 19. Crop 85 lb. Ripe seeds 312 to pint.

48. The Czar (Barr).—Similar to last. Ready August 19. Crop 82 lb. Ripe seeds 280 to pint. One scarlet-flowered rogue.

58. White (Spencer).—Similar to 'White Dutch,' but several scarlet-flowered rogues. Ready August 19. Crop 106 lb.

Czar Type.—Pods longer and broader than in 'White Dutch,' straight.

49. The Czar (R. Veitch), **XXX** August 22, 1918.—Ready August 16. Pods 3 to 4 in cluster, 7 to 9 inches long, $\frac{7}{8}$ to 1 inch broad, with little string; flesh thick. Crop 107 lb. Seeds 210 to pint. A good and true stock.

50. Mammoth White (Sutton).—Ready August 17. Pods rather longer and darker than 49, and with rather more string. Crop 102 lb. Ripe seeds 300 to pint. Two scarlet-flowered rogues. Selected and introduced by Messrs. Sutton.

52, 53. Giant White (Wisley, Barr).—Similar to last, but with smaller crop. Ready August 17. Crops 69 and 90 lb. respectively. Ripe seed 300 to pint. Each stock contained 2 or 3 red-flowered rogues. Selected and introduced by Messrs. Barr.

54. Jubilee (Carter).—Similar to 49. Ready August 17. Crop 87 lb. Seeds 272 to pint. Two scarlet-flowered rogues. Selected and introduced by Messrs. Carter, 1887.

55. Large White (Wisley).—Ready August 16. Similar to 51, but pods 1 inch wide. Crop 104 lb. Ripe seeds 300 to pint. One scarlet rogue.

56. White Emperor (R. Veitch).—Ready August 17. Very much like last, but with some plants of 'Emperor' type. Crop 99 lb.

Giant White Type.—Pods still longer than in 'Czar' and rather narrower. Approaching 'Emperor.'

51. Giant White (Dobbie).—Pods $9\frac{1}{2}$ to $10\frac{1}{2}$ inches (the longest-podded among the white-flowered beans in the trial), $\frac{7}{8}$ inch wide, dark green, with little string; smoother than 'Czar.' Ready August 19. Crop 107 lb.

Emperor Type.—Pods 3 or 4 in cluster, 9 inches long, $\frac{7}{8}$ inch wide, and smoother than in 'Czar.'

57. Emperor White (Barr).—Ready August 16. Crop 100 lb. Ripe seed 330 to pint.

60. Southampton White Runner (Barr).—Ready August 17. Crop 82 lb. Ripe seed 300 to pint. Introduced by Messrs. Toogood.

Monarch Type.—Pods 3 to 5 in cluster, 8 to 9 inches long, $\frac{3}{4}$ to $\frac{7}{8}$ inch wide, narrower than 'Emperor' and rather darker. The white-flowered counterpart of 'Ne Plus Ultra.'

59. White Monarch (Carter).—Ready August 19. Germination less good than in most, hence crop smaller, 73 lb. A selection from 'Scarlet Emperor' by Messrs. Carter, who introduced it in 1908. Ripe seeds 300 to pint.

CLIMBING FRENCH BEANS, 1918.

THE beans numbered 61 to 134 were all climbing varieties of the French Bean, except No. 76, which was wrongly named. They were grown on soil occupied by peas and beet in 1917 and subsequently simply dug. No manure was applied since 1916. The seed was sown singly six inches apart in rows six feet apart on May 21, and germination was good, except in the case of Nos. 67, 68, 74, 82, 83, 87, 89, 91, 101, 108, 118, 127, where it was only fair, and 90, 95, 109, 110, 111, 113, 117, 126, 128, where it was poor. The cold nights and dry weather of June and July checked the growth of the plants to some extent, but after the middle of July they grew away and most fruited well. The Vegetable Committee examined them on two occasions and made recommendations for awards as follows :—

First Class Certificate.

No. 129. Beurre Couronne d'Or (sent by Messrs. Vilmorin).
No. 87. Soissons Blanc (à rames) (sent by Messrs. Vilmorin).
No. 64. Tender and True (sent by Messrs. Sutton).

Award of Merit.

No. 132. Golden Butter (sent by Messrs. Carter).
No. 99. Mangetout de St. Fiacre blanc (sent by Messrs. Vilmorin).
No. 62. Veitch's Climbing French (sent by Messrs. Barr).
No. 63. Tender and True (sent by Messrs. Barr).

Highly Commended.

No. 70. Burger's Green-pod Stringless (sent by Messrs. Burpee).

Nos. 130, 131. Beurre du Mont d'Or (à rames) (sent by Messrs. Barr and Vilmorin).

No. 79. Climbing White (sent by Mr. Chittenden).

No. 90. Dutch Case Knife (sent by Messrs. Vilmorin).

No. 116. Fillbasket (sent by Messrs. Sutton).

No. 66. Flageolet Rouge (à rames) (sent by Messrs. Vilmorin).

No. 77. July Climbing (sent by Messrs. Carter).

No. 78. Earliest of All (sent by Messrs. Sutton). [Nos. 77 and 78 are identical.]

No. 113. Mangetout de la Vallée (sent by Messrs. Vilmorin).

Nos. 106, 107, 108. Mangetout de St. Fiacre (brown) (sent by Messrs. Vilmorin, Barr, and Wisley).

No. 85. McCasland Pole Bean (sent by Messrs. Burpee).

No. 93. Phénomène à rames (sent by Messrs. Vilmorin).

Commended.

No. 72. Kentucky Wonder (white-seeded) (sent by Messrs. Thorburn).

No. 89. Soissons Vert (à rames) (sent by Messrs. Vilmorin).
No. 74. Southern Creaseback (sent by Messrs. Thorburn).
No. 69. The Admiral Wonder (sent by Messrs. Barr).
No. 88. Blanc Géant sans parchemin (sent by Messrs. Vilmorin).

With the exception of Tender and True and Veitch's Climbing French, which as originally grown are said to have been identical and which are both forms of the Climbing Canadian Wonder first grown at Chiswick in 1885, no climbing French bean has previously secured an award (unless the F.C.C. given in 1873 to the bean 'Mont d'Or' was given to the climbing form of that variety ; this our records do not make clear). This state of affairs reflects the neglect of climbing French Beans in our gardens, where almost the only climbing beans that have acquired a place, and that almost a universal one, are the Scarlet Runners. This is the more curious, for in French and American gardens the Scarlet Runner is the exception rather than the rule. The climbing French Bean shares with the Scarlet Runner the need for support (though the support need not usually be so tall), and it is far less ornamental than the Scarlet Runner, but it is scarcely on this account that its cultivation has been so greatly neglected. It is no unusual thing to find that while the French Beans are appreciated as young 'snap' pods in the early part of the season for outdoor beans, as soon as the Scarlet Runner is ready for picking the French Bean is passed over, whether dwarf or tall, in spite of its more delicate flavour.

The only use of French Beans commonly recognized in English household cookery is as 'haricots verts,' or 'snap pods,' and this only in those forms which quickly become tough and have a decided string which must be removed before the young pods are cut up for cooking. The many forms of beans which are practically stringless until very old, the whole pod of which may be cooked entire, are practically unknown, while the use of the nearly full-grown beans ('flageolets') shelled out like peas before they are ripe, and so much appreciated in France, is known to but few of even the best-informed vegetable growers. This use is not even mentioned in those vade-mecums of the gardener, Nicholson's 'Dictionary of Gardening,' or Thomson's 'Gardeners' Assistant,' nor contemplated by the author of that excellent manual of vegetable growing 'The Profitable Culture of Vegetables,' who truly says, 'When French Beans can be got early they are a profitable crop to grow, but the demand for them falls away as soon as runners become plentiful.

Until the Dutch Brown Beans were distributed by the Society, with instructions towards securing the crop of dry beans for winter use, scarcely anyone realized the possibility of increasing the food production of their gardens in this direction, but now that the value of these beans is recognized and the ease with which they can be secured known, we may hope that we shall be self-supporting so far as dry beans of the haricot type for winter use are concerned, and thus owe a lasting debt of gratitude to Mrs. Labouchere, whose praise of the Dutch Brown Beans led to their trial at Wisley. It is true that the dwarf beans (like the Dutch Brown) are in many ways easier to deal with than the climbers, but the climbers have certain advantages, *e.g.* longer bearing, larger cropping powers, and generally rather easier ripening (other things being equal).

One other use may be referred to, viz., the preservation of the green pods for winter use by bottling and pickling, for both of which purposes the French Bean is superior to the Scarlet Runner. Bottling of beans is not a very easy matter, but in our own household has given much better results than the frequently advocated salting down.

The range of variation within this one species (*Phaseolus vulgaris*) is extraordinary, and is seen mainly, but not only, in height, season, toughness or stringlessness of pods, pod-shape and colour, and seed size and colour. The present trial was confined to the tall varieties, and included a good number, though by no means all, well known on the Continent and in America, as well as the majority of those grown in this country. As will be seen by reference to the list of varieties selected for awards and the notes which follow, many more appear to be worth growing widely in our gardens than have hitherto found a place there, and we have endeavoured in the following descriptions to group together the forms which appear to be most nearly related to one another.

Varieties.*

61. Climbing French Bean.
62. ,, ,, ,,
63. Tender and True.
64. ,, ,, ,,
65. ,, ,, ,,
66. Haricot flageolet rouge (à rames).
67. Admiral Wonder.
68. The Admiral.
69. The Admiral Wonder.
70. Burger's Pole Bean.
71. White Creaseback.
72. Kentucky Wonder (white seed).
73. ,, ,, (Old Homestead).
74. Southern Creaseback.
75. Haricot à rames extra-hâtif.
76. July (wrongly named—a dwarf).
77. July Climbing.
78. Earliest of All.
79. Climbing White.
80. Lazy Wife.
81. Quatre-à-quatre (à rames).
82. Haricot Prédome (à rames).
83. Princesse à rames.
84. Seedling 296.
85. McCasland Pole Bean.
86. White Dutch Caseknife.
87. Haricot de Soissons blanc à rames.
88. Blanc Géant sans parchemin (White Giant Stringless).
89. Haricot de Soissons vert à rames.
90. Dutch Caseknife.
91. Phenomenal.
92. Phenomenon No. 8.
93. Phénomène à rames (Phenomenon).
94. Successor.
95. Climbing Haricot.
96. Tall White Haricot.
97. Avant-garde (Vanguard).
98. Délicatesse.
99. Mangetout de St. Fiacre blanc (à rames).
100. Haricot Mangetout du Maine (à rames).
101. Japanese White Bean.
102. Tall White Butter.
103. Haricot de Sallandre amélioré (à rames).
104. Princess of Wales.
105. Re-selected Climbing.
106. Haricot Mangetout de St. Fiacre (à rames).
107. St. Fiacre.
108. ,, ,,
109. Epicure.
110. No. 21 Seedling.
111. Château Salinois.
112. Haricot Mangetout sans filet (à rames), (best stringless).
113. Mangetout de la Vallée.
114. Kentucky Wonder (brown).

* See footnote, p. 96.

115. Haricot jaune d'Or (à rames).
116. Fillbasket.
117. Haricot Coco blanc (à rames).
118. Haricot Coco rose (à rames).
119. Crochin de Vacquayras.
120. Coco bicolore prolifique (à rames).
121. Haricot Coco bicolore du Pape (à rames).
122. Haricot Zèbre gris (à rames).
123. Horticultural or Wren's Egg.
124. Golden Cluster Wax.
125. Golden Cluster Improved Wax.
126. Haricot Beurre du Cambrésis.
127. Beurre d'Or des Mangetout.
128. Haricot Beurre blanc (à rames).
129. Haricot Beurre Couronne d'Or (à rames).
130. Mont d'Or.
131. Haricot Beurre Mont d'Or (à rames).
132. Golden Butter.
133. Haricot d'Alger (Beurre) noir à rames.
134. Kentucky Wonder (Golden Wax Pods).
135. Tepiary Beans.
136. Yard Long or Cuban Asparagus Bean.
137. Siebert's Early Lima.
138. Early Jersey Lima.
139. Madagascar Butter Beans.

Notes and Descriptions.

A. WAX-POD BEANS.

The wax-pod or butter beans [not the butter beans of the grocers' shops, see p. 110] are characterized by the yellow colour of the pods, even when young.

a. *Pods wholly yellow.*

1. Flowers and seeds white.

102. Tall White Butter (Wisley).—Stems over 8 feet, yellow; foliage medium, pale yellow; pods 2 or 3 in cluster, 7½ inches long, straight, flat, ¾ inches wide, golden, smooth, bulging over seeds; flesh fairly thick; string and parchment absent; seeds oval. Crop good, but attacked by rust (*Colletotrichum Lindemuthianum*).

124. Golden Cluster Wax (Burpee)
125. Golden Cluster Improved Wax (Thorburn) } .—Much like No. 102, but somewhat dwarfer; pods 5 or 6 inches long. No disease.

126. Haricot Beurre du Cambrésis (Vilmorin).—Plant about 6 feet in height, much branched; foliage yellowish green; pods generally 2 in a cluster, 5 or 6 inches long, generally curved, flat, ½ to ⅝ inch wide, golden, smooth, bulging over seeds; flesh fairly thick; string and parchment absent; seeds oval. Crop good.

127. Beurre Roi des Mangetout (Vilmorin).—Stems 6 to 8 feet, branched, yellow; foliage yellowish green; pods mostly 2 or 3 in a cluster, 5 to 6 inches long, curved, round in section, ⅝ inch wide, golden, sometimes with a reddish tinge, smooth, flesh very thick, bulging over seeds; neither parchment nor string present; seeds blunt ended, oval. Crop fairly good.

128. Haricot Beurre blanc à rames (Vilmorin).—Also called Tall White Algerian Waxpod. A fairly vigorous variety, 6 to 8 feet in height; stems little branched, yellow; foliage pale, wrinkled; pods generally 2 or 3 in a cluster, about 5 inches long, curved, round in section, about ½ inch wide, golden, smooth, bulging over seeds; flesh thick; somewhat stringy, but with no parchment; seeds small. Crop fair.

129. Haricot Beurre Couronne d'Or à rames (Vilmorin), **F.C.C.**, September 9, 1918.—Plants vigorous, over 8 feet, much branched, stems yellow; foliage large, green, wrinkled; pods 2 to 4 in a cluster, 6 to 8½ inches long, much curved and very irregular and uneven, round in section and barely ⅝ inch in diameter; greenish golden; flesh very thick and spongy, bulging over the seeds; without skin or parchment; seeds flat and kidney-shaped. A heavy crop of ugly, very fleshy pods.

2. Flowers white; seeds black.

133. Haricot d'Alger noir à rames (Vilmorin).—Also called Black Algerian Wax. Plants vigorous, over 8 feet, much branched; foliage green; pods 3 in a cluster, 5 to 5½ inches long, curved, flat at first, somewhat rounded later, about ⅝ inch diameter, pale golden yellow; flesh fairly thick, bulging over seeds; string and parchment absent. Crop heavy but rusted.

b. *Pods yellow splashed purple.*

130. Mont d'Or (Barr)
131. Haricot Beurre du Mont d'Or (Vilmorin) } XXX August 22, 1918.—Plant vigorous, 4½ to 6 feet in height, much branched ; foliage yellowish green ; flowers lilac and mauve ; pods generally 3 in a cluster, 5½ inches long, mostly straight, flat at first, then rounded, about ⅜ inch in diameter, bulging over seeds, without parchment, and without string until almost ripe. Seeds dark violet, marbled with brown. An early variety producing a fair crop.

132. Golden Butter (Carter), A.M. August 22, 1918.—Similar to Mont d'Or, of which it is a selection, but with pods 5½ to 6½ inches long, usually curved, rounder than in Mont d'Or, and not quite so wide, with rather thicker flesh. Crop good ; all three stocks proved susceptible to rust.

134. Kentucky Wonder Waxpod (Thorburn).—A vigorous plant, over 8 feet in height, little branched ; foliage green ; flowers pale heliotrope ; pods mostly in clusters of 3, produced very near ground, 6 to 7 inches long, curved at tip, nearly round, ⅝ inch broad, pale golden with a purplish tinge ; flesh very thick and spongy, bulging much over seeds ; with some string when ripe but without parchment ; seeds flat, kidney-shaped, purplish brown, yellowish at hilum, rather large. Crop good.

B. EDIBLE GREEN-PODDED BEANS.

We include here all those beans not mentioned above which remain free from tough skin or parchment until maturity, and which may therefore be used over a long period and cooked and served whole (except in the cases where the presence of a strong string is noted). Such pods readily break when bent, even when they are nearly full grown.

a. *Pods flattish when marketable.*

1. Seeds white ; flowers white.

80. Lazy Wife (Burpee).—Moderately vigorous, about 4½ feet in height, much branched ; foliage of medium size and colour ; pods in pairs, 4 to 5 inches long, straight except at tip, flattish round, ⅝ inch wide, green and smooth, slightly bulging over seeds, stringless ; flesh fairly thick ; seeds of medium size, oval. Crop small, late. This is regarded as the best general purpose bean in America, being used for all three purposes, but it compared badly in crop with other varieties in our trials.

81. Quatre-à-quatre à rames (Vilmorin).—Moderately vigorous, 6 to 8 feet in height, much branched ; foliage yellowish green, wrinkled, large ; pods 4 in cluster, 4 to 5 inches long, curved, flat round, ½ inch wide, dark green, smooth, beaded with seeds ; flesh fairly thick ; string rather strong ; seeds oval, of medium size. Crop heavy and ripening well ; early.

82. Prédome à rames (Vilmorin).—Fairly vigorous, over 8 feet in height, much branched ; foliage of medium size but smaller towards top, dark green, wrinkled ; pods 5 or 6 in a cluster, 4 inches long, straight, flat round, about ⅜ inch diameter, dark green, smooth, beaded with seeds ; flesh rather thin, string rather strong ; seeds white, oval, small, often flattened at ends. Crop good and continuous, ripening well.

83. Princesse à rames (Vilmorin)
84. Seedling No. 296 (Carter) } .—Very similar to the preceding, but seeds oval, not flattened, and pods stringless. No. 83 is said to be a sport from 'Queen Alexandra,' and is indistinguishable from 'Princess.' Nos. 82, 83, and 84 are all useful as green pods cooked whole, as "shell beans," and for their small ripe seeds, and all are excellent croppers.

88. Blanc Géant sans Parchemin (Vilmorin), XX September 9, 1918.—A vigorous plant, over 8 feet tall, much branched ; foliage very large, dark green and wrinkled ; pods in clusters of 2 to 4, 6 to 8 inches long, mostly straight, flat round, ⅝ inch diameter, pale green, and ultimately yellowish, smooth, crease-backed, i.e. with a marked channel along back of pod ; flesh very thick and spongy, bulging over seeds ; seeds rather large, flat kidney Crop heavy and continuously produced, seeds ripening well.

97. Avant-Garde (Vilmorin).—A vigorous little-branched plant over 8 feet in height ; foliage medium to large, green, wrinkled ; pods 2 or 3 in a cluster, 8 inches long, only slightly curved, very flat, 1 to 1¼ inch wide, pale

green, smooth; flesh fairly thick; the amount of string and parchment developed was variable, and the stock requires selection in this respect; seed large, flat, kidney-shaped. Crop heavy and seeds ripen well. With the exception of 'July Climbing,' the earliest French bean in the trial and with widest pods.

117. COCO BLANC À RAMES (Vilmorin).—Also called 'Gros Sophie' and 'White Coco.' A vigorous plant 6 to 8 feet in height, little branched; foliage green, large, pointed, slightly crimped; pods 2 or 3 in a cluster, 5 to 6 inches long, straight, flat, ¾ inch wide, pale green and smooth; flesh fairly thick, stringless, with no parchment; seeds oval, medium, white. Crop small. Stock not true. The shelled beans (flageolets) of this variety are excellent.

2. Seeds marbled.

118. HARICOT COCO ROSE (Vilmorin).—Also called and long cultivated as 'Haricot de Prague marbré' and 'New Zealand Runner.' Height 5 to 7 feet, fairly vigorous, little branched; foliage large below, green, and more or less wrinkled; flowers white; pods in clusters of 2 or 3, 5 to 7 inches long, straight; flat round, about ¾ inch wide, green with deep red streaks, smooth; flesh fairly thick, stringy at times; seeds medium, oval, marbled purple on buff, with white hilum. Crop fairly good, earlier than No. 117.

119. CROCHON DE VACQUAYRAS (Wisley).—Over 8 feet, little branched; foliage large, yellowish green, mostly flat; flowers reddish lilac; pods mostly in twos and threes, 5 to 7 inches long, straight, flat round, about ¾ inch wide, green streaked red, becoming almost red, smooth; flesh as in 118; seeds medium, oval, dun, marbled purple, sometimes wholly purple, hilum white. Crop fair, early. Should be good for use as 'flageolets.'

122. ZÈBRE GRIS À RAMES (Vilmorin).—Six to eight feet in height, much branched; foliage yellowish green, large, pointed, smaller near top; flowers lilac mauve; pods 2 or 3 in a cluster, 5 to 6 inches long, curved, flat round, ¾ inch wide, dark green with more or less red, rather rough; flesh as 117, almost stringless; seeds large, dark brown marble black, hilum white. Crop fairly good.

123. HORTICULTURAL OR WREN'S EGG (Burpee).—Of medium vigour, 5 to 6 feet high, much branched; foliage yellowish green, of medium size; flowers lilac; pods single or in pairs, 4 to 5 inches long, more or less curved, swollen at point, flat round, barely ¾ inch diameter, pale green with more or less brown clouding, smooth, almost stringless; seeds pale dun with purplish mottling, large; hilum white. Crop medium.

3. Seeds two-coloured.

120. COCO BICOLORE PROLIFIQUE À RAMES (Vilmorin).—Vigorous, over 8 feet in height, little branched; foliage medium to large, pointed, flat, smaller near top; yellowish green; flowers white; pods in threes, 5 to 5½ inches long, straight, flat round, ¾ inch diameter, medium green, becoming yellowish, smooth, shining, stringless; flesh as 117; seeds medium, half white, half brown, oval with blunt ends. Crop good, fairly early.

121. COCO BICOLORE DU PAPE À RAMES (Vilmorin).—Plant like 120, but seeds partly white, partly buff marbled purple. Crop heavy.

112. MANGETOUT SANS FILET (Vilmorin).—Also called 'Best Stringless.' Plants vigorous, over 8 feet, branched; foliage very large, green; flowers lilac; pods generally in pairs, 5 to 6 inches long, straight, flat, ⅝ inch diameter, light green, smooth, sometimes tinged brown; bulging over seeds, stringless and without fibre; seeds buff, oval, blunt-ended, of medium size. Crop good seed ripening well.

b. *Pods more or less round when young.*

1. Seeds white; flowers white.

70. BURGER'S STRINGLESS POLE (Burpee), **XXX** September 9, 1918.—Vigorous, over 8 feet in height, branched; foliage of medium size, more or less wrinkled; pods in clusters of 3 or 4, 6 to 7½ inches long, straight except for curve near point, round, bulged over seeds, about ⅝ inch diameter, crease-backed, medium green, smooth; flesh very thick and spongy; stringless, no fibre; seeds kidney, white, medium. Crop good and produced over long period.

71. WHITE CREASEBACK (Burpee).—Also called 'Best of All.' Vigorous, over 8 feet, branched; foliage medium green, middle-sized; pods 3 to 5 in cluster, 4 or 5 inches long, nearly straight, round, ½ inch in diameter, pale green, smooth, bulging over seeds, crease-backed; flesh thick, with string and some fibre; seeds white, oval kidney, small. Crop good; did not ripen well, but should be useful as 'flageolets.'

74. SOUTHERN CREASEBACK (Thorburn), **XX** September 9, 1919.—Same as 'White Creaseback,' No. 71, but heavier crop.

72. KENTUCKY WONDER (WHITE-SEEDED) (Thorburn), **XX** September 9, 1918.—Vigorous, over 8 feet, branched; foliage wrinkled, green, of medium size; pods 3 to 5 in cluster, produced very near ground, 6 to 8 inches long, more or less curved, round, ½ inch diameter, pale green, streaked purple, smooth, stringless; bulged over seeds, crease-backed; flesh very thick and spongy; seeds flat kidney, medium. Crop heavy.

85. MCCASLAND POLE (Burpee), **XXX** September 9, 1919.—Vigorous, over 8 feet, little branched; foliage very large, dark green, wrinkled; pods 3 or 4 in cluster, 9 to 10 inches long, more or less curved, flat round, ½ inch wide, pale green (at times purple-streaked), bulging over seeds, crease-backed; flesh very thick, spongy, stringless and without fibre; seeds white, kidney. Crop good.

91. PHENOMENAL (Carter).—A vigorous, dark green, much-branched plant with large, wrinkled leaves; pods 3 or 4 in a cluster, 7½ to 9½ inches long, curved towards point, flat round, ⅝ inch diameter, pale green, smooth, bulging over seeds, crease-backed, more or less stringy when old, but without parchment; flesh very thick; seeds white, medium in size. Crop heavy, ripened well. Stock rather mixed. Said to have been raised by J. C. Schmidt in Germany about 1905.

92. PHENOMENON (Wisley).—Similar to 91 but with some flat podded rogues.

93. PHÉNOMÈNE À RAMES (Vilmorin), **XXX** September 9, 1918.—Like 91 but a heavier crop and stock true.

95. CLIMBING HARICOT (Sutton).—Like 91, but foliage paler.

98. DÉLICATESSE (Barr).—Similar to 91.

99. MANGETOUT DE ST. FIACRE BLANC (Vilmorin), **A.M.** September 9, 1918.—Vigorous, over 8 feet high, branched; foliage large, yellowish green; pods 3 to 4 in a cluster, 6 to 7½ inches long, curved, round, ½ inch diameter, pale green, smooth, becoming yellow, bulging over seeds, crease-backed; flesh very thick, spongy, stringless and without parchment; seeds flat kidney-shaped, medium in size, white. Crop very good, early, ripening well.

100. MANGETOUT DU MAINE (Vilmorin).—Similar to 95.

2. Seeds coloured, not mottled.

106, 107, 108. MANGETOUT DE ST. FIACRE (Vilmorin, Barr, Wisley), **XXX** September 9, 1918.—Similar to No. 99, but flowers pale lilac, pods straighter and rather longer, and flesh thicker; seeds dull olive. Stocks not quite true.

109. EPICURE (Sutton).—A vigorous, branched variety, over 8 feet in height; foliage medium green, of medium size; flowers white; pods 2 to 4 in a cluster, 7 inches long, straight, round, ⅝ inch wide, pale green, shining, more or less crease-backed, but with string and parchment when three-quarters grown; flesh thick and spongy, very sappy; seeds oval kidney, dun, medium. Crop good. Near 'St. Fiacre.' Raised and introduced by Messrs. Sutton.

110. SEEDLING NO. 21 (Dobbie).—Much like 106, 107, 108, but flowers white. Crop rather less.

111. CHÂTEAU SALINOIS (Vilmorin).—Of only moderate vigour, about 6 feet in height, moderately branched; foliage yellowish green; flowers white; pods 3 to 5 in cluster, 6 inches long, curved, round, ½ inch wide, medium to dark green, not very smooth, slightly bulging over seeds, crease-backed, string little, parchment none; flesh thick; seeds buff, but rather variable in shape and tint, rather small. Crop good, but not ripening well.

113. MANGETOUT DE LA VALLÉE (Vilmorin), **XXX** September 9, 1918.—Vigorous, over 8 feet, branched; foliage large, green; flowers white; pods 3 to 5 in cluster, 7 to 9 inches long, curved, round, ½ inch in diameter, medium green, smooth, bulging over seeds, crease-backed; flesh very thick, spongy, with some string but otherwise free from fibre; seeds dun, medium, flat. Crop very heavy, ripening well.

73. KENTUCKY WONDER (Thorburn).—Also called 'Old Homestead.' Moderately branched, fairly vigorous plant; foliage medium, yellowish green; flowers white; pods 2 to 4 in cluster, 6 to 8 inches long, curved, ⅝ inch

diameter, bulging over seeds, crease-backed ; pale green streaked red, wrinkled ; flesh very thick, spongy, stringless, and without fibre ; seeds light purple-brown, large. Crop good, but seeds did not ripen well.

114. KENTUCKY WONDER, BROWN (Burpee).—This stock had small marbled seeds, and differed in other characters from the foregoing (No. 73), which is the plant usually grown under that name.

3. Seeds marbled.

115. JAUNE D'OR À RAMES (Vilmorin).—A vigorous, branching variety, over 8 feet tall ; foliage very large, medium green ; flowers white ; pods 3 or 4 in a cluster, 7 to 9 inches long, curved towards point, round, ½ inch in diameter, pale green, smooth, bulging over seeds, crease-backed ; flesh very thick and spongy, stringy when old, but without parchment ; seeds buff with darker marbling, of medium size, more or less kidney-shaped. Crop good, ripening well.

C. PODS TOUGH.

This section includes almost all the forms commonly grown in England, and comparatively few of those most in favour on the Continent or in America. The pods, although they contain parchment (*i.e.* a tough skin forming an inner lining), are tender when cooked young, and in many cases they produce crops of 'flageolets' and dry beans for winter use, but their popularity is probably owing in a measure to the shapeliness of the pods, which are markedly more symmetrical and pleasing to the eye than many of the excellent beans already referred to. It seems probable that too much attention has been paid to this aspect, and too little to the excellent varieties that are less suited for exhibitions where utility and culinary value are not regarded as of importance. At the same time this group contains many varieties of great value, especially those which have been selected for award.

Seeds and flowers white.

75. HARICOT À RAMES EXTRA-HÂTIF (Vilmorin).—A vigorous variety, over 8 feet high, branching, with medium foliage, of a medium green ; pods 3 or 4 in a cluster, 4 to 6 inches long, curved towards point, flat round, about ⅜ inch diameter, smooth, pale green, more or less bulging over seeds, stringy ; flesh fairly thick ; seeds small, white, flat kidney. Crop good ; early ; seeds ripening well.

77. JULY CLIMBING (Carter)
78. EARLIEST OF ALL (Sutton) } **XXX** August 22, 1918.—Similar to No. 75.

No. 77 said to be introduced about fifteen years ago from France by Messrs. Carter. No. 78 said to be raised and introduced by Messrs. Sutton.

79. WISLEY CLIMBING WHITE (Chittenden), **XXX** August 22, 1918.—Related to the last, but with flatter pods, showing less bulging over seeds, rather thinner flesh, and somewhat paler foliage. Seeds medium-small, oval kidney. Heavy cropper ; early ; ripening well. This variety has been grown for many years in the sender's garden, and is probably of French origin, but has not been exactly identified.

86. WHITE DUTCH CASEKNIFE (Burpee).—A fairly vigorous variety, over 8 feet high, branched ; foliage large, green, more or less wrinkled ; pods 2 to 4 in a cluster, 6 to 7 inches long, curved, flat and thin, ⅝ inch diameter, pale green, shining, stringy ; flesh fairly thick ; seeds large, flat, white. Crop fair ; fairly early, but later than Nos. 75, 77–79 ; not quite true and plants unhealthy.

90. DUTCH CASEKNIFE (Vilmorin), **XXX** September 9, 1918.—Similar to preceding but a finer stock with straighter pods, 9 to 10 inches long, ⅞ to 1 inch in diameter, 3 to 5 in a cluster, and a heavier crop which ripened well.

87. HARICOT DE SOISSONS BLANC À RAMES (Vilmorin), **F.C.C.** September 9, 1918.—A very vigorous variety, 10 feet in height, much branched ; foliage very large, dark green, wrinkled ; pods generally in pairs, 6 to 8 inches long, curved, flat, ⅝ to ¾ inch broad, pale green, smooth ; flesh rather thin, with somewhat strong string ; seeds flat, large. The heaviest and most consistent cropper in the trial. Seeds ripened excellently and are very valuable for winter use. Fairly early.

96. TALL WHITE HARICOT (Barr).—A vigorous branched variety over 8 feet in height, with large, yellowish green foliage ; pods usually in threes, 7 to 8 inches long, curved, flat, barely ¾ inch wide, pale green, smooth, stringy

when old ; flesh fairly thick, seeds flat, kidney, large. Crop very good ; fairly early ; seeds ripening well. Somewhat like 87, but that is the better stock.

94. SUCCESSOR (Carter).—Of fairly vigorous growth, 6 to 8 feet tall, little branched, with medium-sized, dark green, wrinkled foliage ; pods generally in pairs, 7½ to 8½ inches long, straight, flat, barely ¾ inch diameter, pale green, shining, with little string or parchment, bulging somewhat over seeds ; flesh fairly thick ; seeds flat, rather large. Crop small ; rather late, did not ripen well. Said to be a selection out of 'July Climbing' (see Nos. 75, 77, 78), but quite distinct from that variety.

101. JAPANESE DAIFUKU BEANS (London Rice Brokers' Association).—A weakly variety about 6 feet in height and but little branched ; foliage medium, yellow-green, more or less wrinkled ; pods single or in pairs, the first pod 30 inches from ground (instead of 6 inches as in most varieties), 7 inches long, straight, flat, about ⅝ inch in diameter, pale green, rough and shining, stringy ; flesh fairly thick ; seeds entirely creamy white, large. Crop small and late. This variety was offered for sale in considerable quantity early in 1918.

103. HARICOT DE SALLANDRE AMÉLIORÉ (Vilmorin).—About 4 to 5 feet high, branching ; foliage medium, yellow-green, somewhat wrinkled ; pods 2 or 3 in cluster, 6 to 7 inches long, straight, flat, ⅝ inch long, pale green, smooth, not very stringy ; flesh fairly thick ; seeds large, kidney. Crop fair, ripening fairly well.

Seeds green ; flowers white.

89. HARICOT DE SOISSONS VERT À RAMES (Vilmorin), **XX** September 9, 1919.—Foliage smaller than 87, paler, more or less wrinkled ; pods with rougher surface ; seeds green and smaller. Crop fairly good, seeds ripening well. Somewhat later than 87.

Seeds purple ; flowers lilac.

'Climbing Canadian Wonder' type.—This type was introduced by Mr. W. W. Ward, and is probably a climbing sport of the group to which the well-known 'Canadian Wonder' belongs. It is probably the most widely grown climbing French bean in England, and has split up into several minor forms having seeds very much alike in colour and size (except No. 66), but differing in minor characters of foliage, pod, colour, and so on. The type was first grown at Chiswick in 1885, and F.C.C. was awarded to 'Tender and True' when shown by Messrs. Sutton in 1891, and to 'Veitch's Climbing French' when shown in 1894. These were subsequently shown to be identical in the Chiswick trials and similar to Ward's 'Climbing Canadian Wonder.' Judging by the descriptions of the variety in these early trials, considerable advance has been made in size of pods and so on, so that present stocks appear to be distinct from these early ones in details. Forms of this type have from time to time been certificated after trial, and the present condition of the stocks is indicated by the awards given in the present trial.

Characters common to all the stocks are as follows :—Plant vigorous, branched, 3½ to 4½ feet high ; foliage more or less light green, of medium size ; flowers lilac ; pods 3 or 4 in a cluster, 4 to 7 inches long, straight, flat, about ⅝ inch broad, pale green, smooth, with little string ; flesh of fair thickness ; seeds large (except in 66), long, kidney, shining purple. Fairly early, but later than 'July Climbing,' and bearing a good crop ; seeds ripening well.

61. VEITCH'S CLIMBING FRENCH (R. Veitch).

62. VEITCH'S CLIMBING FRENCH (Barr), **A.M.** August 22, 1918.—Foliage larger and pods rather broader than No. 61, but contained both green and yellow podded forms.

63. TENDER AND TRUE (Barr), **A.M.** September 9, 1918.—Similar to 62, but pods narrower (like 61) and mainly green.

64. TENDER AND TRUE (Sutton), **F.C.C.** September 9, 1918.—Foliage rather smaller than 62 and 63, but pods on average longer. An excellent stock.

65. TENDER AND TRUE (Carter).—Similar to 61.

66. HARICOT FLAGEOLET ROUGE À RAMES (Vilmorin), **XXX** August 22, 1918.—Pods narrower (about ½ inch), many yellowish, and seeds much smaller than in other stocks of this type. (A pint contains about 1150, whereas the others contain about 600 to 700.)

67. ADMIRAL WONDER (Watkins & Simpson).—Contained some taller plants.

68. ADMIRAL WONDER (Sydenham).—Contained some taller plants.

69. ADMIRAL WONDER (Barr), **XX** September 9, 1918.—Stock true.

Seeds purple brown ; flowers pale lilac.

104. Princess of Wales (Sutton).—A vigorous, little branched variety, about 6 feet high, with large green foliage ; pods mostly in pairs, 6 to 7 inches long, straight, flat, about ⅝ inch broad, pale green, tinged with purple in age, dull, rather rough, stringy ; flesh fairly thick ; seeds large, kidney. Crop rather small ; seeds ripening well. Season of 'Climbing Canadian Wonder.' "Raised and introduced by Messrs. Sutton."

105. Reselected Climbing (Carter).—Precisely similar to 104. Introduced by Messrs. Carter, being "grown on from a sample received in 1904 from a small gardener."

Seeds black ; flowers lilac mauve.

116. Fillbasket (Sutton), **XXX** September 9, 1918.—Vigorous, 6 to 8 feet high, little branched ; foliage very large, green ; pods 3 to 4 in a cluster, 7 to 8 inches long, very straight, flat round, ½ inch wide, pale green, somewhat tinged red, rather rough ; flesh fairly thick ; seeds medium in size, kidney, black with white hilum. Crop fair ; late ; early acquiring parchment and tough string. Raised and introduced by Messrs. Sutton.

The following climbing beans were also sown but failed to produce a crop.

135. Tepiary Bean, from New South Wales, failed to germinate.

136. Yard Long or Cuban Asparagus Bean (Burpee).—Failed to flower. This plant is *Vigna sesquipedalis*, cultivated in Southern France, Italy, and United States of America, but rarely forming its 2½ feet pods in climates with a cool summer like our own.

137. Siebert's Early Lima (Thorburn)
138. Early Jersey Lima (Thorburn)
139. Madagascar Butter Bean (Dowson)
.—These varieties of the Lima bean (*Phaseolus lunatus*) all flowered, and No. 138 formed a few pods, which, however, did not reach any great size. The Lima bean is used to a great extent in the States, where the scarlet-runner, except in the colder parts, is rarely grown, both fresh and dried seeds being used. The dried seeds form the well-known butter beans of commerce. The climbing forms rarely mature seeds in England, and unless one or other of the numerous dwarf varieties prove more amenable to our climate it will certainly be useless to attempt to grow Lima beans as an open-air crop here. Those familiar with the fresh Lima bean as served in the States are high in their praise of its table excellence there, and it is to be regretted that it has so far proved too exacting in its requirements for our climate.

LEEKS TRIED AT WISLEY, 1917–18.

THIRTY-ONE samples of Leeks were sent for trial in 1917. Four were said to be for summer use (Nos. 1 to 4 below), and were sown in pots on March 17, and planted in their permanent quarters on June 25. The seeds of the remainder were sown both in the open ground on March 17 and in pots on March 23. The seedlings of the latter, like the early varieties, were pricked out into boxes, and planted out on July 4, the outdoor-sown seedlings being transplanted on July 11.

The plot was deeply dug and manured well in early June, the plants being put out into shallow trenches 2 feet apart, with plants 12 inches apart in the rows.

All made good growth, and there was little to choose between those raised under glass and those sown in the open.

The Committee visited the trial on February 19, 1918, and recommended awards as follows :

Award of Merit.

No. 18, 'Champion,' sent by Messrs. Dobbie ; 16, 'Internationa Prize,' sent by Messrs. Dobbie ; 25, 'Prizetaker,' sent by Messrs. Sutton ; 10, 'Royal Favourite,' sent by Messrs. Sutton.

Highly Commended.

No. 30, 'Improved Musselburgh,' sent by Messrs. Sutton ; 2, 'Large Early Poitou,' sent by Messrs. Barr ; 14, 'Large Rouen,' sent by Messrs. Barr ; 26, 'Renton's Monarch,' sent by Messrs. Nutting ; 22, 'The Lyon,' sent by Messrs. R. Veitch.

Commended.

No. 13, 'Giant Winter,' sent by Messrs. Barr.

No variety under any of the above names had received an award.

A system of planting Leeks that is very simple, economical, and much practised in some parts of the country, is to sow the seeds thinly at the end of February or early in March, in good soil and a sunny position, and when the plants are 6 or 7 inches long, to put them out in lines 1 foot to 15 feet apart, and the same distance between the plants in the rows. When planting they are put in with a dibber, making a hole 6 or 7 inches deep. A very little soil is put into the hole merely to cover the roots and the hole is left unfilled ; water is given as required, and as the plants grow the usual hoeing to keep down weeds gradually fills the hole left by the dibber, and by the time the Leeks are wanted for use, each plant is blanched 5 or 6 inches at the base. Deep cultivation and liberal manuring naturally tell in the length and thickness of the plants, and, except where exhibition plants are wanted, we can strongly advocate this system.

VARIETIES AND DESCRIPTIONS.*

1. SOUTHERN GIANT (Barr).—Stem 4 to 6 inches in length, 1¾ inch thick, firm; leaves 2 to 3 inches broad, some dark, some yellow-green. Stood winter well. Mixed stock. Introduced by Messrs. Barr.

2. LARGE EARLY POITOU (Barr), **XXX** February 19, 1918.—Stem 6 to 7 inches in length, 2 inches thick, soft, white inside; leaves 3 to 5 inches broad, light yellow-green. Suitable for early use only.

3, 4. BULGARIAN (Nutting, Barr).—Stem 5 to 6 inches in length, 2 to 2¼ inches thick, soft, white inside; leaves 3 to 5 inches broad, light green. Stood winter fairly well. Germination poor.

5. PERPETUAL (Barr).—Stem 4 inches in length, 1½ inch thick, firm; leaves of medium length, 1½ to 2½ inches broad, dark green. Stood winter fairly well. Produces many side shoots, instead of only one large thick stem.

6. WELSH LEEK (Barr).—Stem 4 to 5 inches long, 1¾ to 2 inches thick, firm; leaves 2 to 3½ inches broad, dark green. Stood winter fairly well. Some formed side bulbs.

7. LONDON BROAD FLAG (Barr).—Stem 6 to 7 inches in length, 1¾ inch thick, firm, white inside; leaves 2 to 3 inches broad, medium green. Stood winter rather badly. A poor stock.

8. AMERICAN FLAG (Barr).—Stem 5 to 6 inches in length, 1¾ inch thick, firm, white inside; leaves long, some strap-shaped, 3 to 4 inches broad, dark green. Stood winter well.

9. PRODIGY (Barr).—Stem 4 to 6 inches in length, 2 inches thick, firm; leaves 3 to 3½ inches broad, dark green. Stood winter well. Some with side bulbs. Mixed, broad and narrow leaves. Germination poor. Introduced by Messrs. Kelway.

10. ROYAL FAVOURITE (Sutton), **A.M.** February 19, 1918.—Stem 4 inches in length, 2 to 2½ inches thick, firm; leaves 4 to 5 inches broad, regular, imbricated, dark green. Stood winter well. Raised at the Royal Gardens, Frogmore, by Mr. O. Thomas. Introduced by sender.

11. ROYAL FAVOURITE (Barr).—A mixed stock.

12. PARIS MARKET (Barr).—Stem 6 to 7 inches in length, 1½ to 1¾ inch thick, rather soft; leaves 3 to 4 inches broad, dark green. Stood winter well. Variable in size. Introduced by Messrs. Barr.

13. GIANT WINTER (Barr), **XX** February 19, 1918.—Stem 5 inches in length, thickness 2 to 2½ inches, firm; leaves 4 to 5½ inches broad, dark green. Stood winter well. Introduced by Messrs. Barr. Somewhat like No. 14.

14. LARGE ROUEN (Barr), **XXX** February 19, 1918.—Stem 6 to 7 inches in length, thickness 2 to 2½ inches, firm; leaves 4 to 4½ inches broad, dark green. Stood winter well.

15. CARENTON (R. Veitch).—Stem 5 to 6 inches in length, 1½ inch thick, rather soft; leaves long, some strap-shaped, 3½ to 4 inches broad, dark green, Stood winter rather badly. Introduced by Messrs. Vilmorin and much grown in Northern France. Stock badly mixed.

16. INTERNATIONAL PRIZE (Dobbie), **A.M.** February 19, 1918.—Stem 7 to 9 inches in length, 1¾ inch thick, firm, white inside; leaves 4 to 4½ inches broad, green. Stood winter well.

17. INTERNATIONAL PRIZE (Barr).—A poor stock, mixed and containing bolters.

18. CHAMPION (Dobbie), **A.M.** February 19, 1918.—Stem 6 to 7 inches in length, 2 inches thick, firm, white inside; leaves 3½ to 4½ inches broad, medium green. Stood winter well.

19. Sent as Champion, but wrongly named, and mixed.

20. HOLBORN MODEL (Barr).—Stem 5 to 6 inches in length, 2 inches thick, firm; 3½ to 4½ inches broad, leaves some strap-shaped, dark green. Stood winter well. Introduced by Messrs. Carter.

21. THE LYON (Sydenham).—A stock with short thick stems and dark green foliage. Wrongly named.

22. THE LYON (R. Veitch), **XXX** February 19, 1918.—Stem 6 to 7 inches in length, 2 to 2½ inches thick, firm; leaves 3 to 4 inches broad, green. Stood winter well. Raised by Mr. James Lyon of Yetholm, near Kelso, and introduced by Messrs. R. Veitch.

23. THE LYON, IMPROVED (Barr).—Stem 6 to 7 inches in length, 1½ inch thick, rather soft, white inside; leaves 2½ to 3½ inches broad, green. Stood winter well. Variable in size. Not a good stock.

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* See footnote, p. 96.

24. SELECTED PRIZETAKER (Barr).—Stem 7 inches in length, 1½ inch thick, rather soft ; leaves medium length, 2 to 3 inches broad, green. Stood winter rather badly. Variable. A poor stock of 'Lyon.'

25. PRIZETAKER (Sutton), **A.M.** February 19, 1918.—Stem 5 to 6 inches in length, 2 to 2½ inches thick, firm ; leaves 4 to 5½ inches broad, green. Stood winter well. A very good stock of 'Lyon' type. Introduced by Messrs. Sutton.

26. RENTON'S MONARCH (Nutting), **XXX** February 19, 1918.—Stem 7 to 8 inches in length, 1¾ inch thick, firm, white inside ; leaves fairly long, 4 to 4½ inches broad, dark green. Of rather more compact habit than some varieties. Raised by Mr. Renton of Coldstream. Stood winter well.

27. RENTON'S MONARCH (Veitch).—A stock with rather shorter, thicker stems but rather mixed.

28. RENTON'S MONARCH (Barr).—Like No. 27.

29. MUSSELBURGH SELECTED (Barr).—A somewhat mixed stock.

30. IMPROVED MUSSELBURGH (Sutton), **XXX** February 19, 1918.—Stem 5 to 6 inches in length, 2 to 2½ inches thick, firm ; leaves fairly long, 4 to 5 inches broad, dark green. Stood winter well.

31. HENRY'S PRIZE OR AYTON CASTLE (Barr).—Stem 4 to 5 inches in length, 2 inches thick, fairly firm ; leaves fairly long, 3½ to 4½ inches broad, dark green. Stood winter well. A rather dwarf form, but not true.

VEGETABLE MARROWS AT WISLEY, 1918.

Fifty-seven stocks of vegetable marrows were sent in for trial at Wisley in 1918, but of these three, Nos. 28, 39, and 57 failed to germinate. The seed was sown on April 18 in pots, and the seedlings hardened off, but the weather proved very unsuitable for planting out and this was therefore delayed until June 18. This delay in the pots gave the plants a severe check, and though most made a fair recovery fruiting was delayed until late.

Quarters were prepared for them in land which had been occupied by onions in 1917, and which was dug and manured in spring of 1918. They were planted on the flat 6 feet apart each way.

The Fruit and Vegetable Committee inspected the trial on two occasions and recommended the following awards :

Award of Merit.

No. 38. Pen-y-byd, sent by Messrs. Sydenham.
35. Unique, sent by Messrs. Yates.

Highly Commended (**XXX**).

52, 53. Bush Green, sent by Messrs. Barr, and Messrs. Watkins & Simpson.
32. Cream, sent by Messrs. Dickson & Robinson.
51. Early White Bush, sent by Messrs. Barr.
17. Long Green, sent by Messrs. Dobbie.

Commended.

7. Long White, sent by Messrs. Sutton.

Of these ' Bush Green ' had received an **A.M.** in 1912 when shown by Messrs. Barr, and ' Pen-y-byd ' in 1889 when shown by Mr. Muir ; none of the others had previously received an award.

The following, which had received awards in earlier trials, were represented, but either on account of being now superseded, or of having suffered from the check already referred to, or because the variety was represented by poor stocks, were passed over.

' Long White,' **A.M.** 1889, when shown by Mr. Palmer ; ' Moore's Cream,' **A.M.** in 1889 and 1912, when shown by Messrs. Veitch and by Messrs. Nutting and Messrs. Veitch respectively.

Descriptions and Notes.

On account of the poor growth made in several instances, as explained above, full descriptions of the different varieties are not given, nor is any indication of the relative earliness of the varieties attempted for the same reason.

A. Habit Trailing.

(a) Fruit long.

1. White.

9. *Duplex (Dunton).—Long oval, faintly ribbed, smooth.
2. Early White Running (Watkins & Simpson).—Smooth, cylindrical or thickened at end.
1. First of All (Barr).—Cylindrical, smooth. Not quite true.
5. Long White (Dobbie).—Long oval, slightly thickened towards end.
6. Long White (Barr).—Long oval, sometimes club-shaped, some ribbed, some not.
7. Long White (Sutton), XX September 9, 1918.—Long oval, more or less clubbed, ribs more or less prominent, smooth.
4. Long White Ribbed (Barr).—Long oval, ribbed. Stock not true.
8. Long White Ribbed (Sydenham).—Club-shaped, ribbed.
10. Prizetaker White (Wilson).—Long oval, ribbed.
11. The Roller (Clucas).—Cylindrical or long oval.
3. Trailing White (Carter).—Long oval, slight ribbed.

2. Cream.

12. Long Cream (Sutton).—Cylindrical, sometimes ribbed.
13. Long Cream (Yates).—More or less club-shaped, slightly ribbed.
14. Long Cream (R. Veitch).—Cylindrical, slightly ribbed.
33. King's Acre Cream (Barr).—Cylindrical, smooth. A mixed stock.

3. Green, striped.

15. Long Green (R. Veitch).—Slightly clubbed.
16. Long Green Trailing (Sydenham).—Club-shaped, slightly ribbed.
17. Long Green (Dobbie).—Club-shaped, usually slightly.
19. Long Green (Sutton).—Cylindrical, smooth. One of the largest fruits.
20, 21. Long Green Striped (Watkins & Simpson, Barr).—Cylindrical, smooth.
22. Long Green Re-selected (Carter).—Oval or club-shaped; very large.
23. Long Green (Barr).—Club-shaped, smooth.
26. Walhampton Attraction (Honess).—Flask or club-shaped, ribbed; becoming golden orange.

(b) Fruits oval.

1. Cream.

32. Cream (Dickson & Robinson), XXX August 22, 1918.—Oval, large.
30. Moore's Cream (R. Veitch).—Short oval, smooth. Stock not true.
31. Moore's Cream (Sydenham).—Oval, smooth.
29. Moore's Cream Selected (Barr).—Oval, smooth. Stock mixed.
35. Unique (Yates), A.M. September 9, 1918.—Oval, large, smooth; much like No. 32.
34. Vegetable Marrow (Sutton).—Egg-shaped to oval, smooth, small.
27. Woodfield Gem (Poulet).—Oval, smooth.

2. Green, striped.

24. Table Dainty (Barr).—Short oval to flat round, smooth.
25. Table Dainty (Sutton).—Oval, smooth; fruiting at every joint, but not constant in colour.
44. Green Falstaff (Veitch).—A mixed stock, some green, some white.

3. Green yellow, becoming golden.

48. Prolific (Dobbie).—Oval, smooth.

Fruits round.

1. Creamy white.

36. Pen-y-byd (R. Veitch).—Not a true stock. Fruits long oval. Large.
37. Pen-y-byd (Barr).—Mixed in colour.
38. Pen-y-byd (Sydenham), A.M. September 9, 1918.—Flat round, smooth. Fruits small.

* See footnote, p. 96.

2. Green, striped.

40. PERFECTION (Sutton).—Round, smooth; small.

3. Orange.

42. ROTHERSIDE ORANGE (Watkins & Simpson).—Almost round, smooth; small.

Fruits 'Turk's Cap.'

47. TURKISH (Barr).—Set very badly.

Fruits 'Custard' type, round, cream.

44. IMPROVED CUSTARD (Sutton)—Ribbed, small.

B. HABIT BUSH.

(*a*) *Fruits long.*

1. White.

51. EARLY WHITE BUSH (Barr), **XXX** September 9, 1918.—Long oval, smooth.
50. WHITE BUSH (Sutton).—Cylindrical, slightly ribbed, smooth.

2. Green, striped.

52, 53. BUSH GREEN (Barr, Watkins & Simpson), **XXX** September 9, 1918.—Cylindrical to club-shaped, ribs obscure.
18. CHUSAN GREEN (Barr)—Mixed stock.
54. IMPROVED GREEN BUSH (Sutton).—Fruits club-shaped, slightly ribbed.
45. NAPLES (Barr).—Cylindrical to club-shaped, ribbed.

(*b*) *Fruits oval, orange.*

46. TRIPOLI (Barr).—Fruits of various colours, egg-shaped, small.

(*c*) *Fruits round, mottled green.*

49. EPICURE (Carter).—Flat round, obscurely ribbed, of medium size.
56. TENDER AND TRUE (Sutton).—Smaller than No. 49.

(*d*) *Fruits 'Custard,' white.*

43. CUSTARD MARROW (R. Veitch).—Lobed, flat round, with broad ribs, small.
55. WHITE CUSTARD (Barr).—Flat, with obscure ribs; fruits larger.

SPRING-FLOWERING STOCKS TRIED AT WISLEY, 1916–17.

ONE hundred and eighty packets of stock seed were sent to Wisley for trial for flowering indoors during 1916. The seed was sown, so far as the 'Brompton Stocks' (Nos. 1 to 30) were concerned, in 6-inch pots on June 27, 1916, and the seedlings pricked out into boxes on July 27, as soon as they were large enough to handle. The boxes were kept in cold frames until the seedlings were ready for potting into 3-inch pots in the latter part of August, when they were transferred to a cool greenhouse. They were re-potted in the first week of October into 6-inch pots and grown on in these all through the winter in a cool greenhouse where the temperature often fell to 36° F. Under this treatment. the utmost care being taken in watering, they grew steadily and flowered splendidly in April and May 1917, scarcely a plant failing. The other types of stocks were similarly treated except that the seed was not sown until July 25, pricking out done August 11, first potting September 29, and final potting during October and November.

The Floral Committee examined the flowering plants on two occasions, May 4 and May 17, and made the following recommendations.

Award of Merit

166. Mammoth Pale Lilac, sent by Mr. Dawkins } identical.
162. Nice Giant Light Blue sent by Messrs. Nutting } identical.
133. Mammoth Rose, sent by Mr. Dawkins.
112. Mammoth Pyramid Flesh-colour, sent by Messrs. Hurst.
14. Crimson Brompton, sent by Messrs. R. Veitch.

Highly Commended.

137. Abundance, sent by Messrs. Dickson & Robinson } identical.
127, 128, 129. Queen Alexandra, sent by Messrs. Hurst, Watkins & Simpson, and Dickson & Robinson } identical.

101, 102. Almond Blossom, sent by Messrs. R. Veitch and Messrs. Hurst.

114, 117, 118. Beauty of Nice, sent by Messrs. Dickson & Robinson, Hurst, and Watkins & Simpson.

177, 178. Côte d'Azur, sent by Messrs. R. Veitch and Messrs. Hurst.

40. East Lothian Scarlet, sent by Messrs. R. Veitch.
45. East Lothian Crimson, sent by Mr. Dawkins.
13. Giant Brompton Crimson, sent by Messrs. Barr.
78. H. J. Vansittart Neale, sent by Messrs. Hurst.

82, 84, 86. Madame Rivoire, sent by Messrs. Dickson & Robinson, R. Veitch, and Hurst.

173, 174. Mammoth Dark Blue, sent by Mr. Dawkins and Messrs. Hurst.

147. Mammoth Pyramid Crimson, sent by Messrs. Hurst.

124. Mammoth Pyramid Salmon Rose, sent by Messrs. Hurst.

132. Mammoth Pyramid Rose, sent by Messrs. Hurst.

107. Nice Canary Yellow, sent by Messrs. Watkins & Simpson
108. Mammoth Pyramid Yellow, sent by Messrs. Hurst — identical.
109. Yellow of Nice, sent by Messrs. Hurst

88. Mont Blanc, sent by Messrs. Hurst.

122, 123. Nice Giant Early Salmon, sent by Messrs. Hurst and Messrs. Nutting.

164, 165. Parma Violet, sent by Messrs. Barr and Messrs. Hurst — identical.
167. Mammoth Pyramid Lilac, sent by Messrs. Hurst

104. Princess Mary, sent by Messrs. R. Veitch.

119. Pyramid Chamois, sent by Messrs. Watkins & Simpson.

27. Purple Brompton, sent by Messrs. R. Veitch.

139, 140. Rose of Nice, sent by Messrs. Veitch and Messrs. Hurst.

113. Souvenir de Nice, sent by Messrs. Barr.

28. Violet Queen, sent by Messrs. Daniels.

91. White of Nice, sent by Messrs. Watkins & Simpson — identical.
93. White of Nice, No. 2, sent by Messrs. Hurst

152. John Bright, sent by Messrs. Dickson & Robinson
156. Mammoth Pyramid Blood Red, sent by Messrs. Hurst — identical.

70. Intermediate White, sent by Messrs. R. Veitch — identical.
76. Perpetual White, sent by Mr. Dawkins

DESCRIPTIONS AND NOTES.*

I. Brompton Stocks.

White.

1. †Snow-white Brompton (Daniels).—18 inches; flower 1½ inches; spike rather looser than other whites.

2, 3, 4, 5, 8. White Lady (Barr, Hurst, A. Dickson, R. Veitch, Daniels).—14 to 18 inches; flower 1¾ inches; spike dense, rather short.

6. White Brompton (R. Veitch).—18 inches; flower smaller, of less substance, and not so white as foregoing; earliest to flower.

7. Pure White (Barr).—18 inches; flower 1¾ inches; spike fairly dense. A good type.

Magenta.

9, 11, 12. Old English Scarlet (Barr); Scarlet (R. Veitch); Giant Scarlet (Nutting).—Little branched; 20 to 28 inches tall; spike rather lax; flower 1½ to 1¾ inches.

10. Cottager's Scarlet (Hurst).—Like foregoing, but spike denser; flower 2 inches diameter.

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* The actual numbers of doubles and singles produced by each lot of seed will be found by reference to the Table on p. 76 and is not therefore repeated here. In that Table the "Number of Culture" corresponds with the number of the variety in these descriptions.

† All plants grown for trial at Wisley are known by number only until judgment is completed.

Crimson.

13. Crimson (Barr), **XXX** May 4, 1917.—Branching ; 20 inches ; spike fairly dense ; flower 1½ inches.

14. Crimson (R. Veitch), **A.M.** May 4, 1917.—Like No. 13, but spike denser and flowers larger. The best of its shade.

17. Bright Rose (Barr).—Much like No. 14, but wallflower-leaved.

Rose Purple.

16, 19, 20, 21, 22, 23, 24, 25. Empress Elizabeth (R. Veitch, A. Dickson, Dickson & Robinson, Barr, Hurst, R. Veitch, Daniels, Daniels).—Branching ; 14 to 28 inches ; spike rather lax ; flower 1¾ to 2 inches. No. 16 was sent as Rose Brompton, No. 24 as Carmine, and No. 25 as an improved stock of Carmine, and it gave a much higher percentage of doubles than No. 24.

Light Purple.

26. B19 (Daniels).—Branching ; 24 to 36 inches ; spike dense ; flowers 2 inches diameter. Early in flower (March 1).

27. Purple (R. Veitch), **XXX** May 17, 1917.—Branching ; 15 to 18 inches ; spike fairly dense ; flowers 1¾ inches.

30. Light Violet (Daniels).—Spike looser ; flower larger.

Dark Purple.

28. Violet Queen (Daniels), **XXX** May 4, 1917.—Branching ; 16 to 24 inches ; spike dense ; flower 2 inches. The first to flower (November 20 onwards to end of May).

Mixed.

15. Brilliant Crimson (Daniels).—Mainly rose-purple, but gave several whites.

18. Bright Rose (Daniels).—Mainly bright rose-purple, but some pink.

II. East Lothian, Ten Week, and Intermediate Stocks.

Flowers White.

31, 32, 33, 34, 35, 36, 38. East Lothian White (Barr, A. Dickson, Daniels, Barr, Dobbie, Dawkins, Hurst).—Branching ; 12 to 18 inches high ; spike dense ; flower 1¾ to 2 inches. No. 31 was sent as 'Snowdrift.'

37. East Lothian White (R. Veitch).—Taller ; spike denser ; flower larger.

39. East Lothian Wallflower-leaved White (R. Veitch).—Branching ; 9 inches ; foliage glabrous ; spike dense ; flower 1¾ inches ; late (May 2, onwards). Dwarfer than Nos. 71–75.

71, 72, 73, 74, 75. All the Year Round (Hurst, Daniels, R. Veitch, Barr, Sutton).—Branching ; 12 inches ; spike short, dense ; flower 1¾ to 2 inches ; foliage glabrous.

70. Intermediate White (R. Veitch)
76. Perpetual White (Dawkins) } **XXX** May 4, 1917.—Dwarf, 10 to 12 inches ; branching ; spike dense ; flower 1½ to 2 inches.

77. Princess Alice (R. Veitch).—Little branching ; 13 inches ; spike lax ; flower 1½ inches ; early.

78. H. Vansittart Neale (Hurst), **XXX** May 17, 1917.—Little branching ; spike dense ; flower 2¼ inches.

79, 80. Bianca (Hurst, R. Veitch).—Little branching ; 17 to 24 inches ; spike dense ; flower 2¼ inches.

81. Column (R. Veitch).—Scarcely branching ; 12 inches ; spike fairly dense ; flower 1¾ to 2 inches ; early.

82, 84, 86. Madame Rivoire (Dickson & Robinson, R. Veitch, Hurst), **XXX** May 4, 1917.—Branching ; 18 to 24 inches ; spike dense ; flower 2 inches ; fairly early.

83, 85. Madame Rivoire (Barr, A. Dickson).—Like preceding, but less even in growth and with fewer doubles.

88. Mont Blanc (Hurst), **XXX** May 17, 1917.—Branching ; 14 to 17 inches ; spike dense ; flower 2 inches.

87, 89, 90. Mont Blanc (Watkins & Simpson, R. Veitch, Barr).—Like No. 88, but Nos. 87 and 90 with fewer doubles and No. 89 laxer in the spike.

91. White of Nice (Watkins and Simpson)
93. White of Nice, No. 2 (Hurst) } **XXX** May 17, 1917.—Branching, 14 to 18 inches; spike dense; flower 2 to 2¼ inches; somewhat like 'Princess Alice' (No. 77), but distinct.

92. White of Nice, No. 1 (Hurst).—Taller and generally rather larger-flowered than preceding.

94. Nice Giant Improved White (Nutting).—Branching; 16 to 21 inches; spike dense; flower 1¾ inches.

95. Mammoth White (Dawkins).—Branching; 16 to 19 inches; spike dense; flower 2 inches.

96. White Christmas (R. Veitch).—Branching; 16 to 19 inches; spike looser than No. 95; flower 2 inches.

97. Winter White (Dawkins).—16 to 18 inches; spike few-flowered; flower 2 inches; late.

98. White Queen (Nutting).—Branching; 16 to 18 inches; spike fairly dense; flower 1¾ inches. Much like Nos. 70 and 76, but taller; 55 per cent. double.

99. White Queen (Barr).—All single.

Flowers White with Pinkish Flush.

101, 102. Almond Blossom (R. Veitch, Hurst), **XXX** May 4, 1917.—Branching; 20 to 25 inches; spike dense; flower 2 to 2½ inches. A beautiful variety.

100. Almond Blossom (Barr).—Nearly all singles and not all true.

103. Almond Flower (Hurst).—Like Nos. 101 and 102, but not a true stock.

Flower Sulphur Yellow.

107. Nice Canary Yellow (Watkins and Simpson)
108. Mammoth Pyramidal Yellow (Hurst)
109. Yellow of Nice (Hurst) } **XXX** May 4, 1917.—Branching; 15 to 18 inches; spike fairly dense; flowers 2 to 2½ inches.

105. Monte Carlo (Barr)
106. Canary Yellow (A. Dickson)
110. Nice Giant Yellow (Nutting) } Like preceding, but with generally smaller percentage of doubles. The singles are white.

104. Princess May (R. Veitch), **XXX** May 4, 1917.—Branching; 15 inches; foliage glabrous; spike dense; flower 1¾ inches; early.

111. Queen of the Yellows (R. Veitch).—Darker and later than last.

Flowers Flesh-coloured.

112. Mammoth Pyramidal Flesh Colour (Hurst), **A.M.** May 4, 1917.—Branching; 17 inches; spike dense; flower 2 inches.

113. Souvenir de Nice (Barr), **XXX** May 17, 1917.—Very similar to No. 112, but somewhat taller.

114, 117, 118. Beauty of Nice (Dickson & Robinson, Hurst, Watkins & Simpson), **XXX** May 4, 1917.—Branching; 16 to 20 inches; spike dense; flower 2½ inches.

115, 116. Beauty of Nice (R. Veitch, A. Dickson).—Like preceding, but with fewer doubles.

131. Peach Blossom (R. Veitch).—Like Nos. 115, 116.

135. Old Rose (Hurst).—Branching; 21 inches; spike dense; flower 2¼ inches.

Flowers Chamois.

119. Pyramidal Chamois (Watkins & Simpson), **XXX** May 4, 1917.—Branching; 20 to 24 inches; spike dense; flower 2½ inches.

120. Mammoth Chamois (Dawkins).—Similar to 119, but with few doubles; singles paler than doubles.

Flowers Salmon, Centre Yellowish.

124. Mammoth Pyramidal Salmon Rose (Hurst), **XXX** May 17, 1917.—Branching; 18 to 22 inches; spike dense; flower 2 inches.

121. Mammoth Salmon Rose (Dawkins).—Rather paler than last; germination poor.

122, 123. Nice Giant Early Salmon (Hurst, Nutting), **XXX** May 17, 1917.—Branching; 14 to 19 inches; spike dense; flower 2 to 2¼ inches.

Flowers Magenta.

147. MAMMOTH PYRAMIDAL CRIMSON (Hurst), **XXX** May 17, 1917
141, 142, 144. CRIMSON KING (A. Dickson, Hurst, Barr)
145. SOUVENIR DE MONACO (R. Veitch)
146. CRIMSON BEAUTY (Dawkins)
158. UNNAMED NOVELTY (Hurst)
—Branching; spike dense; flower 1½ to 2 inches. No. 147 was the best stock. Nos. 142, 144, 145 had somewhat lax spikes.

148, 149, 150. LA BRILLANTE (Watkins & Simpson, Hurst, R. Veitch).—Branching; 10 to 15 inches; spikes rather lax; flower 1¾ to 2 inches; early.

154. WINTER SCARLET (Dawkins).—Branching; 18 to 20 inches; spikes rather lax; flower 1¾ inches; late.

160. NICE GIANT DEEP RED (Nutting).—Branching; 16 to 19 inches; spikes dense; flower 2 inches; very early.

47. WALLFLOWER-LEAVED CRIMSON (Daniels).—Branching; 18 inches; foliage glabrous; spike lax; flower 1½ inches; late.

153. GIANT CRIMSON (Daniels)
155. BLOOD RED (R. Veitch)
—Not branching; 10 to 16 inches; foliage leathery, hoary; spike rather lax; flower 2 to 2¼ inches; fairly early.

Flowers Crimson.

40. EAST LOTHIAN SCARLET (Veitch)
45. EAST LOTHIAN CRIMSON (Dawkins)
XXX May 17, 1917.—Branching; 11 to 16 inches; spike rather lax; flower 1½ inch.

43. EAST LOTHIAN SCARLET (Dobbie)
46. EAST LOTHIAN CRIMSON (R. Veitch)
51. EAST LOTHIAN RICH CRIMSON (Barr)
—Like preceding, but with fewer doubles.

48, 49, 50. EAST LOTHIAN CRIMSON (Hurst, A. Dickson, Dobbie).—Branching; 11 to 16 inches; spike fairly dense; flower 1½ to 1¾ inch.

41, 42, 44. EAST LOTHIAN SCARLET (Hurst, Daniels, Barr).—Much like preceding.

152. JOHN BRIGHT (Dickson & Robinson)
156. BLOOD RED (Hurst)
XXX May 17, 1917.—Branching; 12 to 14 inches; spike dense; flower 1¾ inches.

NOTE.—The above groups differ from one another in depth of colour.

Flowers Rose Purple.

56. EAST LOTHIAN BRILLIANT ROSE (Barr).—Branching; 12 inches; spike uneven; flower 1¾ inches.

57, 157. EAST LOTHIAN ROSE (Dobbie, Daniels).—Dwarf, 10 to 12 inches; branching; spike very dense; flower 2 inches; slightly paler than No. 56.

159. VESUVIUS (R. Veitch)—Scarcely branching; 22 inches; spike few-flowered; flower 2 inches.

Flowers Pinkish Mauve.

52, 53, 54, 55. EAST LOTHIAN ROSE (Daniels, Hurst, A. Dickson, R. Veitch).—Branching; 12 to 16 inches; spike dense; flower 1¾ inches.

125. PYRAMIDAL ROSY LILAC (Watkins & Simpson).—A mixed stock mainly of this shade.

132. PYRAMIDAL ROSE (Hurst), **XXX** May 4, 1917.—Branching; 15 inches; spike fairly dense; flower 2¼ inches.

134. PYRAMIDAL ROSE (Watkins & Simpson).—Taller and with denser spike than No. 132; paler than No. 133, &c.

133. ROSE (Dawkins), **A.M.** May 4, 1917.—Much branching; 15 inches; spike fairly dense; flower 2 inches.

139, 140. ROSE OF NICE (R. Veitch, Hurst), **XXX** May 4, 1917.—Like preceding.

136. CARMINE OF NICE (Hurst)
138. ABUNDANCE (R. Veitch)
—Similar in shade to preceding, but less good stocks. No. 138 distinct from No. 137, 'Abundance,' which is the same as 'Queen Alexandra.'

127, 128, 129. QUEEN ALEXANDRA (Hurst, Watkins & Simpson, Dickson & Robinson)
137. ABUNDANCE (Dickson & Robinson) —XXX May 17, 1917.—Branching; 16 to 24 inches; spike dense; flower 2 to $2\frac{1}{2}$ inches.

126, 130. QUEEN ALEXANDRA (A. Dickson, Barr)
169. TWILIGHT (R. Veitch) —Like preceding, but with fewer doubles.

Flowers Light Purple.

58, 59, 60. EAST LOTHIAN LAVENDER (Barr, Dobbie, Daniels).—Branching; 12 to 16 inches; spike dense; flower $1\frac{1}{2}$ to 2 inches. No. 59 gave some dark purples.

67. EAST LOTHIAN PURPLE (A. Dickson).—Scarcely different from preceding.

161. BLUE BEAUTY (Dickson & Robinson).—Branching; 17 to 21 inches; spike dense; flower $2\frac{1}{2}$ inches. Gave some dark purples.

177, 178. CÔTE D'AZUR (R. Veitch, Hurst), XXX May 17, 1917.—Branching; 18 to 24 inches; spike dense; flower 2 to $2\frac{1}{4}$ inches.

163. LIGHT BLUE (A. Dickson)
170. MAUVE KING (Barr) —Similar to preceding.

162. NICE GIANT LIGHT BLUE (Nutting)
166. MAMMOTH PALE LILAC (Dawkins) A.M. May 4, 1917.—Branching; 18 to 24 inches; spike dense; flower $2\frac{1}{4}$ inches. The Committee prefers the name 'Parma Violet' for this variety. Paler than No. 177.

164, 165. PARMA VIOLET (Barr, Hurst)
167. PYRAMIDAL PALE LILAC (Hurst) XXX May 4, 1917.—Like preceding.

168. QUEEN AUGUSTE VICTORIA (Watkins & Simpson).—Like preceding, but habit less good.

Flowers Dark Purple.

61. EAST LOTHIAN MAUVE (Dawkins)
63, 64, 65, 66, 68. EAST LOTHIAN PURPLE (Dawkins, Daniels, Barr, R. Veitch, Dobbie) —Branching; 16 to 24 inches; spike rather lax; flower 2 inches.

173, 174. MAMMOTH DARK BLUE (Dawkins, Hurst), XXX May 4, 1917.—Branching; 18 to 22 inches; spike very dense; flower 2 to $2\frac{1}{4}$ inches.

175. NUIT D'ÉTÉ (Hurst)
179. NICE GIANT DARK VIOLET (Nutting) —Like preceding.

171. QUEEN OF THE VIOLETS (R. Veitch)
176. SUMMER NIGHT (R. Veitch) —Wallflower-leaved and darker than No. 175.

180. QUEEN PURPLE (Barr).—Branching; 11 to 14 inches; spike loose; flower 2 inches.

Flowers of Various Colours.

62. EAST LOTHIAN CARMINE (Dawkins).—Various shades.
69. EMPEROR MIXED (Dawkins).—With a high percentage of doubles.
151. QUEEN SCARLET (Barr).—Various shades.
172. LILAC QUEEN (Barr).—Mainly light shades.

REPORT OF THE CONSULTING CHEMIST FOR 1918.

By Dr. J. AUGUSTUS VOELCKER, M.A., F.I.C., F.L.S.

DURING the twelve months thirteen samples, as against twenty-two in 1917, were sent by Fellows of the Society for analysis. These comprised—

Soils	3
Waters	2
Flue dust	2
Waste manurial materials	3
Lime	1
Miscellaneous	2
	13

1. *Soils.*—The first of the three came from land in the Cotswolds which had been out of cultivation for several years, and had been lately ploughed up for putting into corn. It was a brownish-yellow coloured heavy clay, with still heavier clay subsoil. Analysis of it gave :—

(Soil dried at 100° C.)

	per cent.
Organic matter and loss on heating	7·81
Oxide of iron	7·80
Alumina	7·30
Lime	10·78
Magnesia	·79
Potash	·50
Soda	·46
Phosphoric acid	·46
Sulphuric acid	·18
Carbonic acid	7·80
Insoluble silicates and sand	56·12
	100·00
Nitrogen	·265

This soil, it will be seen, was well supplied in lime, and also in vegetable matter and nitrogen. Moreover, it was exceptionally rich in phosphoric acid and also had a plentiful amount of potash, so that, altogether, it should prove quite a suitable soil for wheat-growing, provided that the necessary cultivation be given to it. This, rather than any manuring, is what such a soil requires.

A second case was one of garden soil in Surrey and this contained :—

(Soil dried at 100° C.

	per cent.
Organic matter and loss on heating	8·78
Oxide of iron and alumina	9·25
Lime	1·00
Phosphoric acid	·36
Alkalies &c.	1·61
Insoluble siliceous matter	79·00
	100·00

Though rather on the heavy side for general gardening purposes, such a soil should be well suited to rose-growing, and is not at all poor in constituents of fertility, though, for a garden soil, it would be the better for more vegetable matter such as stable manure would supply.

2. *Waters.*—One of the two samples sent was good and pure. It contained 15·12 grains per gallon of total solid constituents and was quite free from ammonia, having also but little dissolved organic matter. The other sample of water was turbid and coloured. It was found, on analysis, to contain much dissolved organic matter, though not otherwise polluted. Efficient filtration would in such a case render a water capable of being used.

3. *Flue-dust.*—Materials sold under this name are often of very variable character. If they come from regular blast-furnaces, they may contain considerable amounts of potash salts, but, too frequently, the sweepings of any flues employed in manufacturing processes are recovered and designated by this name, without, however, containing enough potash to make their use on the land remunerative. In addition to this they may contain certain ingredients actually harmful to vegetation.

Of the two samples sent, the first was of blast-furnace dust, but of decidedly low quality, though free from any injurious constituents. The second came from a furnace where wood had been almost exclusively used as fuel.

	A per cent.	B per cent.
Oxide of iron and alumina	12·10	
Lime	37·33	
Silica	19·23	49·70
Potash	2·15	·60
equal to sulphate of potash	3·98	1·11

4. *Waste Manurial Materials.*—The first was of ash from the burning of pitch along with charcoal. This was found, however, to contain a large amount of soluble sulphides which would, no doubt, be very harmful to vegetation.

The next was a spent "carbonizer," which it was thought might be useful as a fertilizer. Analysis gave :—

	per cent.
Loss on drying	7·09
Carbonaceous matter	44·10
Oxide of iron and alumina	4·59
Phosphate of lime	35·13
Carbonate of lime &c.	4·26
Silica	4·83
	100·00

This material, it will be seen, had a very considerable amount of phosphate of lime, which, however, was in a form not readily available for plant use. Still, it could quite well be employed by makers of artificial manures, who could treat it with oil of vitriol and thus make the phosphates available.

The third waste material was a fertilizer made from leather dust, this latter having been treated with sulphuric acid with the object of rendering the nitrogen soluble and available. To a certain, but limited, extent this had been effected, the material showing on analysis :—

	per cent.
Total nitrogen	6·50
Readily available nitrogen	·32

About one-third of the nitrogen in organic form was soluble in water, but it remains open to question how far this would be of practical utility. Undoubtedly it would be a great benefit if one could convert old leather scraps &c. into some form in which they might benefit the land, but, so far, leather has been looked on, and with good reason, simply as a material for adulterating artificial manures and making them show a fictitiously high analysis. Whether the leather, finely ground and treated as above, is of different nature and has any worth, must be left for experimental inquiry.

5. *Lime.*—A material sold as a fertilizer under the name "Carbo Limo" was sent me by a Fellow of the Society, who had purchased it at the price of 35*s*. a ton at the works. It was stated to come from cement works. The analysis was :—

	per cent.
* Lime	53·62
Oxide of iron and alumina	·69
Carbonic acid &c.	42·33
Insoluble siliceous matter	3·36
	100·00
* equal to carbonate of lime	95·75

This was practically pure carbonate of lime, and it was, further, in nice, dry, powdery condition. Still, the price, in comparison with that of burnt lime (which has nearly twice as much lime in it) is much too high.

6. *Miscellaneous.*—A sample of sand used in potting was sent me, as this was suspected of having done injury to young seedlings, for which it had been used. I thought it possible that the sand contained excessive amounts of salt, but analysis of it proved this not to be the case, the sand being perfectly good.

The remaining sample under this head was one of clay, which it was thought might prove to be "Fullers' Earth." Analysis, it may be pointed out, is, in itself, no clear guide as to whether a clay be Fullers' Earth or not, and the only real guide is the practical application of tests for its absorptive and decolorizing properties, chiefly as regards its behaviour to oils. So far as indications went in this case, the material answered to the description.

A few matters of consultation and examination of materials used at the Society's Gardens at Wisley completed the work of my Department.

DONORS OF SEEDS, PLANTS, BOOKS, &c., TO THE SOCIETY'S LABORATORY AND GARDEN AT WISLEY DURING THE YEAR 1918.

ALEXANDER & BROWN, Messrs., Perth. Brussels Sprouts.
ALLARD, E. J., Merton. Seeds of *Zephyranthes minima*.
ARNOLD, Capt. A. Seeds and roots of *Ranunculus asiaticus*.
ARTINGSTALL, Messrs., Liverpool. Brussels Sprouts.
BARING-GOULD, Mrs., Guildford. Old R.H.S. Journals for Library.
BARR, Messrs., Covent Garden. Seed of 'Belvedere' Primrose; seeds from Macedonia; *Meconopsis simplicifolia*, *M. simplicifolia* Bailey's form, *M. pseudo-integrifolia*, *M. Prattii*; Melon 'Gordon Smith' × 'Golden Beauty'; seeds of *Bletia hyacinthina*, *Delphinium divaricatum*; Beans (see p. 95); Carrots; Marrows (see p. 115); Kales; Brussels Sprouts; Tomato 'Queen of the West'; seed of *Aquilegia jucunda*; Onion 'Perfect'; Asters; seed of fine form of *Thalictrum dipterocarpum*; seeds of fine purple form of *Lunaria biennis*.
BEAUMONT, S., Shere. Old R.H.S. Journals for library.
BILNEY, W. A., J.P., Weybridge. Rhododendron seeds.
BOND, Mrs., London. German Lentils.
BOWLES, E. A., M.A., V.M.H., Waltham Cross. Seeds of *Lilium candidum* Salonika form.
BROOKLYN BOTANIC GARDEN, New York, U.S.A. Collection of seeds.
BROWN, Mrs., Brighstone, I. of W. Cuttings of Olearia sp.
BUTTON, Pte. C., E.E.F. Seeds of flowering shrub from Palestine.
CARTER, Messrs., Raynes Park. Beans (see p. 95); Carrots; Brussels Sprouts; Marrows (see p. 115); Kales.
CAYLEY, Lady, Cobham. Cinnamon-vine tubers. Planted in garden.
CECIL, Hon. Mrs. EVELYN, London. German Lentils.
CHICHESTER, Miss, Barnstaple. Seedlings of *Araujia sericifera*.
CHITTENDEN, F. J., F.L.S., V.M.H., Wisley. Seed of *Iris Tolmieana*.
CHRISTY, W. M., Emsworth. Seed of *Aquilegia Stewarti*; *Primula scotica*.
CLUCAS, J. L., Ormskirk. Kale 'Ormskirk Hearting Curled'; Marrow 'The Roller' (see p. 115).
CLUTTON-BROCK, J. A., Weybridge. Dutch Brown Beans for distribution.
CRANE, D. B., London. Seeds of bulbous creeper from Portuguese E. Africa.
CRANFIELD, W. B., Enfield. *Acrostichum peltatum*. Planted in garden.
DE LACHEVALIER, G., Nigeria. Seeds of *Coleus dysentericus*.
DICKSON, BROWN & TAIT, Messrs., Manchester. Beans (see p. 95); Brussels Sprouts.
DICKSON & ROBINSON, Messrs., Manchester. Brussels Sprouts; Vegetable Marrow (see p. 115); Carrots; Beans (see p. 95).
DOBBIE, Messrs., Edinburgh. Potatos for experiment; Annual Chrysanthemums; Marigolds; Beans (see p. 95); Carrots; Kale 'Dobbie's Victoria'; Brussels Sprouts 'Dobbie's Selected'; Marrows (see p. 115).
DUNKIN, H., Warwick. Seed of White French Bean.
DUNTON, A. S., Wolverhampton. Vegetable Marrow 'Duplex.' (See p. 115.)
FARMER, J. T. H., Moretonhampstead. Potatos for locality trial.
FINDLAY, A., Auchtermuchty. Copy of 'The Potato, its History and Culture' for library.
FLEMYNG, Rev. Canon W. W., Portlaw. Seedlings of *Cydonia japonica*.
FLETCHER, H. M., Loughton. Seedlings of *Swertia perennis*, *Primula japonica*; seed of *Primula Bulleyana* and *P. pulverulenta*.
FORTEVIOT, Lady, Perth. Cuttings of *Dacrydium cupressoides*.
FRASER, G., Ucluclet, Canada. Strawberries 'Magoon' and 'Progressive' for trial.
GIBSON, Messrs., Bedale. Achilleas.
GIFFORD, F., Hornchurch. *Paeonia officinalis lobata*. Planted in garden.
GLENDENNING, R., Canada. Various Canadian seeds.
GODFREY, G. B., Chignall St. James. Seeds of Dwarf Beans for trial.
GRAY, Z., Sandy. Brussels Sprouts.
GRIEVE, Mrs., Chalfont St. Peter. Plants of Star Broccoli.
GRIMES, J., Cardiff. Cuttings of unknown Willow.
GROVE, A., London. Seed of *Lilium regale*.

HALES, W., Chelsea. *Bryophyllum crenatum* and seeds of *Lens esculenta*. Soya Beans.
HANBURY, Lady, Ventimiglia, Italy. Collection of seeds.
HANCOCK, T., Mansfield. Brussels Sprouts 'Hancock's Hercules'; Bean 'Handcock's Exhibition' (see p. 95).
HARRIS, J., Swansea. Seed of Tomato 'Bide's Recruit' × 'Harris's Superb.'
HATTON, Rev. C. O. S., Christchurch. Berberis plants.
HAY, T., London. Collection of plants for rock garden.
HIGH COMMISSIONER FOR NEW ZEALAND, London. Culinary Peas for trial.
HOARE, A. E., Bildeston. Cuttings of *Phagnalon sordidum.*
HOLMES, W. G., Tain. Brussels Sprouts; and Kale.
HONESS, W. H., Lymington. Marrow 'Walhampton Attraction.' (See p. 115.)
HUDSON, Messrs., London. Collection of miscellaneous seeds.
HURST, Messrs., Houndsditch. Brussels Sprouts 'Covent Garden.'
JEKYLL, Miss G., V.M.H., Godalming. Bulbs of Sweet Leek. Planted in garden.
KEEBLE, Dr., C.B.E., London. Seeds of Bean 'Metis.'
KING, Messrs. E. W., Coggeshall. Brussels Sprouts 'Perfection.'
KINGSCOTE, T., M.V.O., Cirencester. *Acer purpurea.* Planted in garden.
LACAITA, C. C., Petworth. Seed of *Echium lusitanica.*
LANCASTER, P., Calcutta, India. Seed of *Calendula stellata*; various Indian bulbs.
LAWRENCE, Sir WILLIAM, Bt., Dorking. Seeds of *Swainsonia galegifolia* &c.
LAXTON, Messrs., Bedford. Potato 'Early Laxton'; perpetual Strawberries for trial.
LEPARD, Rev. A. G. C., Dover. Tubers of Potato 'Glad Eye.'
LEWIS, A. H., Marlow. Dutch Brown Beans for distribution.
LODER, G. W. E., Ardingly. Plants for rock garden.
LONDON RICE BROKERS' ASSOCIATION, London. Japanese Daifuku Beans.
LONGSTAFF, Mrs., Wimbledon. Primula seed from Burzil Pass.
LOUCH, C., Totton. Dutch Brown Beans for distribution.
LUCAS, C. J., Horsham. Seeds of *Acer griseum, Westaria multijuga* and *W. multijuga rosea*; Orchids (growing on); Sobralias (growing on).
LUCKHAM, Miss K., Cheltenham. Seed of *Dianthus lusitanicus.*
MACK & MILN, Messrs., Darlington. Beets.
MAGOR, E. J. P., St. Tudy. Seeds of *Lilium Parryi.*
MARSHALL, R., Bexley. Gardeners' Chronicle. For Library.
MCMICKEN & DIXON, Messrs., London. South African Brown Beans.
METHUEN, Sir A. M. S., Haslemere. Collection of Orchids.
MIDDLEHURST, H., Liverpool. Broccoli 'Lancashire Hardy'; Swede 'Gateacre.'
MORRIS, S., Norwich. Dutch Brown Beans. For distribution.
MORSE, Messrs., San Francisco. Lettuce seed. For trial 1919.
NEWDEGATE, Sir FRANK, Tasmania. Seeds.
NOKIN, F. N., St. Agnes. Ferns and *Tillandsia Lindeni.*
NOTCUTT, R. C., Woodbridge. Plants for rock garden and cuttings of Cistus.
ORWIN, S., Oxford. Seeds of *Sophora tetraptera.*
PAUL, Messrs. G., Cheshunt. Raspberries. Added to trial.
PHILLIPS, Dr. H. W., Croydon. Collection of Sempervivums. Planted in rock garden.
PIRIE, Misses, Ripley. Cuttings of Hibiscus.
POULET, Messrs., Morriston. Marrow 'Woodffeld Gem.' (See p. 115.)
POWELL, W., London. Cotton seed.
PUNNETT, R. C., Cambridge. Maize seed.
PURCHAS, Rev. A. B., Rugby. *Collomia grandiflora.*
ROSS OF BLADENSBURG, Sir JOHN, K.C.V.O., Rostrevor. Collection of seeds.
ROYAL GARDENS, Kew. Collection of seeds.
SALMON, C. E., Reigate. Seeds of *Stachys intermedia* and various plants for rock garden.
SAMUELSON, Lady, Cobham. Seeds of Pie or Preserving Melon.
SARGENT, Prof. C. S., Arnold Arboretum, U.S.A. Seed of *Quercus coccinia.*
SAVORY, Mrs., Cobham. Orchids.
SCARLETT, J. W., Musselburgh. Brussels Sprouts; Kale 'Matchless.'
SCRASE-DICKINS, C. R., Horsham. Watsonia bulbs.
SHRUBSHALL, A. H., Christchurch, N.Z. Seeds of New Zealand shrubs.
STAWARD, R., Hertford. Brussels Sprouts 'St. Fort.'
STOKES, Messrs., Trowbridge. Varieties of *Chrysanthemum maximum.*
STREATFIELD, Miss, Bawtry. Old R.H.S. JOURNALS for Library.
SUTTON, Messrs., Reading. Beans (see p. 95); Carrots; Brussels Sprouts Vegetable Marrows (see p. 115); Kales.

SYDENHAM, Messrs., Birmingham. Marrows (see p. 115); Kales; Carrots; Brussels Sprouts; Beans (see p. 95)

SYKES, Lady, Broadway. Bulbs of Crown Imperials from Persia. Planted in garden.

TAIT, J., Duns. Seedling Potato.

THOMASSET, Lieut. B. C., E.E.F. Flower seeds from Palestine mountains.

UPPSALA BOTANIC GARDEN, Sweden. Collection of seeds.

VEITCH, Sir HARRY, V.M.H., London. Books for Library.

VEITCH, Messrs., Exeter. Beans (see p. 95); Brussels Sprouts; Carrots; Kales; Marrows (see p. 115); Strawberry 'La Perle.'

VILMORIN-ANDRIEUX, Messrs., Paris. Climbing Beans. (See p. 95.)

WALKEY, C. E. J., Taunton. Onion seed.

WATKINS & SIMPSON, Covent Garden. Bean 'Admiral Wonder' (see p. 95); Kales; Brussels Sprouts; Carrots; Vegetable Marrows (see p. 115); seed of *Zinnia elegans robusta plenissima fl. pleno* 'Achievement.'

WATTS, Mrs. G. F., Guildford. Dutch Brown Beans for distribution.

WILKS, Rev. W., M.A., V.M.H., Shirley. Seed of *Silene orientalis*; *Anemone alpina sulphurea*; cuttings of Erica sp.; seedlings of fine form of *Anemone Pulsatilla*; seedling *Lobelia ureus*; seed of Shirley Poppy for distribution.

WILLIAMS, J. C., Gorran R.S.O. Seed of Rhododendrons collected by Mr. Geo. Forrest.

WILLIAMSON, J. F., Mallow. Potatos for experiment.

WILLIAMSON, Mrs., Weybridge. Seeds of pumpkins, stringless beans, sweet corn, &c.

WILSON, J., Hereford. Vegetable Marrow 'Wilson's Prizetaker White.' (See p. 115.)

WOODWELL, H. A., Streatham. Seeds of blue Pea from Morocco. Plants raised and identified as *Lathyrus sativus coeruleus*.

YATES, Messrs., Evesham. Marrows (see p. 115); Brussels Sprouts.

BOOK REVIEWS.

"The Exploitation of Plants." By various writers. Edited by F. W. Oliver, F.R.S. 8vo. vii + 170 pp. (Dent, London, 1917.) 2*s.* 6*d.* net.

The contributions to this little volume, from the Introduction by the Editor to the final chapter on Coal, are all alike worth reading for their interest and suggestiveness, though, as the Preface indicates, the subjects dealt with are far from covering the ground the title would lead one to suppose. The titles of the chapters are "Plant Food and Soil Problems," by W. B. Bottomley; "Waste Lands," by F. W. Oliver; "Timber Production in Britain," by E. J. Salisbury; "Tropical Exploitation, with Special Reference to Rubber," by J. C. Willis; "The Cotton Plant, its Dependent Industries, and Natural Science," by W. L. Balls; "Vegetable Dyes," by S. M. Baker; "Tea-Making," by S. E. Chandler; "The Plant as Healer," by E. N. Thomas; and "Plants as a Source of National Power—Coal," by M. C. Stopes.

Large as the area covered by these articles is, the field is larger still, and, while parts of it are well tilled, others are merely scratched, and others again overgrown by weeds. This is particularly true perhaps for the lands of much of our great overseas Empire, but true also for much at home, and until a more liberal outlook towards scientific botany is established, it is likely to be true. The exploitation of plants depends not only upon labour and commerce, though both are important; not only upon a demand for ample supplies, though this is essential; but also upon the supply of properly trained, scientifically equipped men who will be able to do their part in the great work still to be done. The means of training such men exist but need to be developed, the men for training will not be difficult to find when the one thing necessary is established, *i.e.* opportunity for work between the time of initial training and the time of taking up responsible posts. Co-operative effort on the part of those who will chiefly benefit by progress in plant exploitation, so that the sums of money required, not really very large, to provide for the training and subsequent experience may be forthcoming, is the direction in which we must look for such progress. When we consider that more than 50 per cent. of the trade of Great Britain is directly dependent upon plant products, it is scarcely too much to hope that the funds may be forthcoming.

"The Book of the Rothamsted Experiments." By A. D. Hall, F.R.S. Ed. 2. Revised by E. J. Russell, F.R.S. 8vo. xl + 332 pp. (Murray, London, 1917.) 10*s.* 6*d.* net.

We reviewed the first edition of this excellent summary of Rothamsted's unique contributions to the science of agriculture soon after it appeared in 1905. This second edition adds ten years to the tables showing the results of the experiments, and points out how these results modify, although the modifications are very small, the conclusions previously arrived at. These additions and the chapter on the secondary effects of manures by Sir Daniel Hall, and one on the recent investigations of living activities in the soil are the only changes made, and they serve to bring the book quite up to date.

"Seaside Planting: For Shelter, Ornament, and Profit." By A. D. Webster, La. 8vo. 156 pp. (Unwin, London, 1918.) 18*s.* net.

Tree and shrub planting as well as the planting of Marram Grass and other grasses, plays an important part in the reclamation of waste lands near the sea, and their protection from drifting sands, salt winds, and flying foam.

Mr. Webster's wide experience in tree planting in all sorts of situations has enabled him to give an account of methods and types of planting which have been successful in different soils and situations around the English coast, and to show what a wealth of material is at the disposal of the English planter who wishes to plant near the sea "for shelter, ornament, and profit."

Not only are the trees and shrubs most suitable dealt with, and their characteristics, virtues and faults plainly stated, but the extraneous aids, such as wattle hurdles, used at different times are also described and their values in certain circumstances pointed out.

Insect and fungus pests are also dealt with.

A feature of the book is the excellent series of illustrations of trees and shrubs from photographs. Unfortunately several of them are of trees photographed in inland situations, and do not therefore show the characters of the trees as seen in maritime situations, exposed to heavy winds and the salt spray.

It is curious to see no mention in the copious lists Mr. Webster gives of *Eucalyptus Gunnii*, the hardiest of the blue gums thriving as tall timber trees on an exposed hill-top near Brightlingsea in Essex, to note the omission from the list of seaside plants of *Sedum anglicum* though *S. acre* is mentioned, and to read that *Asplenium marinum* is the only seaside fern. More than one other thrives on sea-cliffs, and on many a Cornish cliff *Osmunda regalis* grows in abundance.

"Genetics in Relation to Agriculture." By E. B. Babcock and R. E. Clausen. 8vo. xx + 675 pp. (Hill Publishing Co., London, 1918.) $3.50.

This is one of the clearest accounts of the fundamentals of genetics and of the applications of that branch of biological science to plant and animal breeding that has yet appeared. Moreover the writers are careful to point out that, in spite of the enormous development of the science during the past seventeen or eighteen years since the translation of Mendel's last paper was published in our JOURNAL, "it must always be remembered that the full possibilities of applying genetics to breeding problems must await the gradual development of scientific research," and to warn the practitioner that "if he would do his share in the creation of new and more efficient types of crop plants, he must utilize the facts brought to light by botanical, physiological, agronomic, and horticultural investigations. The scientific plant breeder of the future should combine the qualities of investigator and practical agriculturist."

The sentences quoted are perhaps the most emphatic statements of opinion to be found in the book, the rest of it being clearly-set-out references to the work and conclusions of almost all those who have made contributions to the subject.

The first 286 pages are devoted to fundamentals of genetics, the next 157 to plant-breeding, the remainder to animal-breeding, and at the end is a very full index and an excellent bibliography, so that the book contains all that the serious student can desire.

The portion on plant-breeding will naturally interest the horticulturist most, and it forms indeed a valuable epitome of our present knowledge of methods. The history of the work, not only in America, but in other countries, is very clearly and impartially written, and the importance of each method lucidly described.

The book covers so wide a range and that so completely, that it is impossible to do more than indicate its contents in a general way and leave it with the assurance that its readers will find no other book to surpass it as a lucid guide to the science of genetics.

"Genetics Laboratory Manual." By E. B. Babcock and J. L. Collins. 8vo. xi + 56 pp. (Hill Publishing Co., London, 1918.) $1.00 net.

This is the first attempt at a laboratory manual of practical plant and animal breeding. The subject is a difficult one to deal with satisfactorily in a course of laboratory work, on account of the length of time that elapses between one generation and the next, but that is overcome to a large extent by the use of the common vinegar fly, *Drosophila melanogaster*, as the type for experiment and demonstration. This and work with plants to note variations, and plot them out, with practical work in the recording of strains, descriptions of individuals and the like, make a good course for the student of agriculture, and the little book is one which the teacher will find extremely suggestive.

"Everybody's Flower Book." By F. M. Ramsay. Illustrated by M. Snape. 8vo. xi + 126 pp. (Simpkin, Marshall, Kent & Co., 1918.) 5*s*. net.

The title of this book scarcely conveys what the work really is, for it is devoted to the artistic arrangement of flowers in rooms, table and other decorations, and the most suitable receptacles for arranging flowers in. A great deal may be learnt on these subjects; the colours of the vase or receptacle, and the most effective foliage and flowers to use to match them so as to produce the most harmonious blending, and so on. Where these things are not very carefully considered, some ghastly combinations result. Those who are fond of flowers about the house, and like to see them to the greatest advantage, will profit by this book, and gain some useful wrinkles from its pages.

The book is nicely printed and illustrated, and of a handy size.

"The Food Producing Garden." By H. A. Day, F.R.H.S. 8vo. ix + 98 pp. (Methuen, London, 1918.) 2*s.* net.

Vegetables, fruits, some flowers, poultry, rabbits, and bees—all are dealt with here, and much good advice given; but here and there the author's enthusiasm leads him to statements and recommendations which, followed, will often lead to disaster. It is not safe to use washing soda "in small and frequent quantities—say an ounce to a square yard." Now and again in some soils washing soda may, as the result of subtle chemical reactions which it sets up, prove beneficial in small quantities, but even at 1 oz. to the square yard we are getting 3 cwt. to the acre, and if this be added frequently in some soils it will, not slowly, lead to sterility.

Most of the mistakes and perverse ideas at which the author tilts are real—some few are more imaginary than real—and many are less fearsome than one would suppose. It is, however, well to ventilate these things, and criticize them at times, but better perhaps that our criticisms be based upon broad sympathies. And the garden is broad enough to furnish all men, at any rate all men not in search of purely self-centred pleasures, with delights—some will make it wholly "useful," *i.e.* they would grow little or nothing in it but what would furnish food for their stomachs—a quite laudable practice which we would do nothing to decry, for in the doing of it they are gaining that pleasure which the cultivation of a garden can give—but others will find greater refreshment for their spirit in some other form of garden, even in a garden consisting only of a lawn, and may they not be justified too? If the lawn be well kept it is a pleasure to the eye for almost all the year, and its greenness a real refreshment to the spirit of man, and not an entirely selfish pleasure as our author would have us believe.

Would that he had sung the joys of gardening for food production, and penned its sorrows too if he wished, to point his moral and adorn his tale, without passing such severe strictures on those whose tastes may differ from his—then should we have gained the much good there is in this little book with greater pleasure and greater readiness.

"A Simple System of Book-keeping for Farmers and Smallholders, with a Model Statement of Accounts and Balance-sheet." By D. G. Macdonald and James Grant. 8vo. 72 pp. (Chambers, London, 1918.) Stiff covers, 1*s.* 6*d.* net.

There is great need for extended knowledge and use of accurate methods of book-keeping in almost all enterprises connected with the land, for rarely is it possible to find out the cost of growing individual crops, so as to compare the relative profits they afford and see where saving in labour expenses may be effected. The little pamphlet (it is scarcely more) under review gives a clear and succinct description of the best plan of keeping simple farm accounts with a minimum of labour, but still so as to show exactly the condition of affairs financially at the end of the working year. Although it is designed especially for the small farm, yet the principles it attempts to inculcate are the same for the horticultural holding; and this being so we can confidently recommend it to the horticultural smallholder or the market gardener.

"Medicinal Herbs and Poisonous Plants." By David Ellis, D.Sc. xi + 179 pp. 8vo. (Blackie, London [1918].) Paper boards, 2*s.* 6*d.* net.

The conditions imposed by the Great War have taught us all how dependent we have been upon overseas supplies of many things easy to produce in this country, and among them common herbs are by no means least important.

The present little book gives botanical descriptions of the plants which are used in medicine, and of poisonous plants native in this country, together with notes upon their properties and medicinal uses. It does not deal with cultivation. The excellent outline drawings of the plants referred to form a feature of the book of much value.

"Seed Farming in Britain." By A. J. MacSelf. 8vo. 32 pp. (Hortus Printing Co., Burnley, 1919.) Paper boards, 2*s.* 6*d.*

The author has done a good work by publishing this little book, for none upon this subject existed in England. With his wish that we may more and more see the seed requirements of the British Empire satisfied by seeds grown within the British Empire, as indeed with most of his suggestions, we are wholly at one, and it is no impossible ideal. With his warnings, too, to avoid attempting to save seeds in small gardens (with a few exceptions), and that germination tests are only one of the important tests to apply to seeds, and perhaps, though important, much less so than tests of trueness to name and quality of stock, we are in the most cordial agreement.

Our only criticism is that the book does not tell us enough. This is true, we think, in almost every section of the many in the little book ; and indeed the subject is worthy of a larger treatise where the special methods of dealing with different crops may be detailed, so that we may have in reality "a practical treatise on the cultivation of vegetables for the production of seeds" suitable for the guidance of the expert as well as the tyro, and we hope the author may see his way to give it us ere long.

"Food Gardening for Beginners and Experts." By H. Valentine Davis, B.Sc. Ed. 2. viii + 133 pp. (Bell, London, 1918.) Paper covers, 1*s*. net.

We noticed this little book in its first edition (see JOURNAL R.H.S. xliii. p. 194), and are glad to see a second edition so soon called for. We fear, however, that, except in highly favoured districts where the temperature is milder, the rainfall ampler, the soil richer, and the light more prolonged in the "dark months" than in our own southern home, those who follow the directions as to seeding and planting time here given will suffer much disappointment. We have previously alluded to one or two of the suggestions made, and will content ourselves by saying that Main Crop potatos planted on June 2 and lifted by September 1, in time to sow winter spinach on their site, will give as a rule a much reduced crop, the reduction being much greater than is compensated for by the spinach cut before the potatos went in.

"Flora of County Kerry." By R. W. Scully, F.L.S. 8vo. lxxxi + 406 pp. (Hodges & Figgis, Dublin, 1916.) 12*s*. 6*d*. net.

County Kerry is one of the most interesting parts of the United Kingdom to the field naturalist, for it embraces a flora derived partly from that of S.W. Europe. The country of Arbutus and numerous Saxifrages cannot fail to be of outstanding interest, and the author's observations on the intermediates between *Saxifraga Geum* and *S. hirsuta*, which occur so numerously on the Kerry Mountains, add much of interest and value to what appears to be a very carefully and conservatively written local flora. The introduction gives a full and valuable account of the soil and geological features of the county.

"The Chemistry of Farm Practice." By T. E. Keith. 8vo. xii + 253 pp. (Chapman & Hall, London, 1917.) 6*s*. net.

This is an excellent elementary treatise on farm chemistry, dealing first with quite elementary chemical principles and going on to the special chemistry of foods, soils, insecticides and fungicides, and with one or two other things, such as paint and concrete, rarely included in a handbook of this kind. Standard methods of analysis are given, where analytical processes can be introduced with advantage, and carefully compiled tables add to the value of a lucid account, which might with advantage be put into the hands of any student.

"School Entomology." By E. Dwight Sanderson and L. M. Peairs. 8vo. vi + 356 pp. (Chapman & Hall, London, 1917.) 7*s*. net.

This is intended for the use of students in "vocational and industrial schools," and well fulfils its purpose as an "elementary text-book of entomology for secondary schools and agricultural short courses." The two parts of which it consists deal respectively with the structure and classification of insects in general, and with the methods approved for their control. They are both excellent, and the reputation of the senior author as an expert economic entomologist is only added to by this latest work. We could wish that an English edition of the book were available for our schools, for though the general classification given will fit English conditions as well as American, yet some of the examples chosen are necessarily rare in this country, and others of greater importance might easily be substituted for them.

"Sweet Pea Annual, 1919." Ed. by J. S. Brunton, F.R.H.S. 83 pp. (National Sweet Pea Society, 1919.) 2*s*.

In spite of the Great War, which has claimed so much of our energies and restricted so many of our activities, the love of flowers has not been allowed to die, and Rose, Chrysanthemum, Carnation, Daffodil, Dahlia, Viola, and, not least, Sweet Pea Societies, have all survived to renew their existence, we hope with increased vigour, when the piping times of peace shall come again. This Annual tells its tale of the spread of that love of flowers which is so characteristic of English-speaking peoples wherever they may be, and contributions come from New York and Christchurch, Dunedin and Nova Scotia, as well as from Scotland and places in between, to make a very interesting and suggestive "Annual" for sweet-pea lovers, despite the turning of almost all their land into food production in these last years.

"Plant Products and Chemical Fertilizers." By S. Hoare Collins, M.Sc., F.I.C. 8vo. xvi + 236 pp. (Baillière, Tindall & Cox, London, 1918.) 7*s.* 6*d.* net.

The chemistry of Fertilizers, Soils, Crops, and Meat Production all comes in for its due share of discussion in this useful and clearly written book. It is not written around one set of conditions nor for one set of crop producers, but all branches of crop production are dealt with, and the author throws many a side-light upon methods of treating crops for market, as well as upon the actual growing of them to a size fit for utilization. The book therefore appeals to a very wide public, and deserves to be upon the shelves of everyone not entirely satisfied to follow tradition and established custom in producing his crops, ready to hand for constant consultation. A valuable part of the book is the list of authorities to be consulted by those desiring further information on the subject-matter of each chapter.

"Jottings of an Allotment Gardener." By E. T. Ellis. 8vo., 144 pp. (Times Printing Co., Mexboro, 1919.) Paper covers, 1*s.* 6*d.* net.

This little book is full of hints to the allotment gardener—and most of them valuable anywhere in the country, although written mainly, perhaps, with a somewhat northern climate in view.

It would be strange if, in such a book as this, we could find ourselves in entire agreement with everything written; and sometimes our little disagreements arise from a certain want of precision in parts: e.g., p. 74 speaks of Climbing French or Runner Beans, as though the two were synonymous; "and" would have been a better conjunction, as the context shows. "Butter beans" are understood by most allotment-holders to mean the large white beans of the grocers' shops, and a word of warning would be worth while that "Golden Butter Beans" are in no way like these, but "waxpod" French beans, not difficult to grow, while the others are impossible in our climate. Allotment-holders sometimes grow peas—and who shall blame them? But instead of enlarging upon the great return they make, a warning that for the land they occupy—unless the cultivation is very good indeed—the actual amount of food produced is small, might well have been given. So, too, with Brussels Sprouts—unless they are grown much better than on the vast majority of allotments where the owner has no means of raising them early and cannot get enough manure to "do them well"—the returns are poor indeed. To advocate onion-growing on one page and deprecate it on another is confusing, as is the direction to avoid sowing turnips after March. Some of the "reasons why" are very far from satisfying, and we fear the author's experience of school-gardens has been but circumscribed and peculiarly unfortunate, else he would scarcely have written as he has concerning them.

We merely draw attention to some of the little defects we find in this generally excellent and often humorous little book—and humour is so often absent from such books (unless it be unconscious, and that is the most refreshing of all) that to meet it is refreshing—in the hope that a second edition may see them (together with the few misprints that occur) modified.

NOTES ON RECENT RESEARCH

AND

SHORT ABSTRACTS FROM CURRENT PERIODICAL LITERATURE, BRITISH AND FOREIGN,

AFFECTING

HORTICULTURE & HORTICULTURAL SCIENCE.

THE Editor desires to express his grateful thanks to all who have so willingly assisted in making abstracts. He would be glad if any who have time and who are willing to help in any special direction in making the abstracts more complete would communicate with him.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP IN THIS WORK.

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Henslow, Rev. Professor Geo., M.A., F.L.S., F.R.H.S., V.M.H.
Hodgson, M. L., F.R.H.S.

Hooper, Cecil H., M.R.A.C., F.R.H.S.
Jeffery, Violet G., F.R.H.S.
Kerridge, Rev. A. A., M.A., F.R.H.S.
Lake, G. D., F.R.H.S.
Ludford, R. J., F.R.H.S.
Newstead, Professor R., A.L.S., F.E.S., F.R.S., F.R.H.S.
Pethybridge, G. H., B.Sc., Ph.D., F.R.H.S.
Petts, Alger, F.R.H.S.
Ramsbottom, J. K.
Rendle, A. B., M.A., D.Sc., F.L.S., F.R.S., F.R.H.S., V.M.H.
Reuthe, G., F.R.H.S.
Rolfe, R. A., A.L.S., F.R.H.S.
Ross, R. C. S., F.R.H.S.
Scott Elliot, G. F., M.A., B.Sc., F.L.S., F.R.H.S., F.R.G.S.
Simmonds, A., F.R.H.S.
Smith, William G., B.Sc., Ph.D., F.R.H.S.
Veitch, Sir Harry J., F.L.S., F.Z.S., F.R.H.S.
Webster, A. D., F.R.H.S.
Whittles, W., F.R.H.S.
Williams, S. E., F.R.H.S.
Wilson, Gurney, F.L.S., F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used for their titles.

Journals, &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
American Journal of Botany	Amer. Jour. Bot.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. Hé.
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Nant. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Applied Biology	Ann. Appl. Biol.
Annals of Botany	Ann. Bot.
Annual Report Agricultural Research Station, Long Ashton	Ann. Rep. Agr. Res. Stn., Long Ashton.
Beiheft zum Botanischen Centralblatt.	Beih. Bot. Cent.
Boletim da Real Sociedade Nacional de Horticultura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Bollettino della R. Società Toscana d'Orticultura	Boll. R. Soc. Tosc. Ort.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Bull. Bot. Dep. Trin.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Contributions from U.S.A. Herbarium	Contr. fr. U.S.A. Herb.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agriculture, Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr. W.I.
Journal of Agricultural Research	Jour. Agr. Res.
Journal of Agricultural Science	Jour. Agr. Sci.
Journal of Botany	Jour. Bot.
Journal of Chemical Society	Jour. Chem. Soc.
Journal of Ecology	Jour. Ecol.
Journal of Economic Biology	Jour. Econ. Biol.
Journal of Economic Entomology	Jour. Econ. Entom.
Journal of Genetics	Jour. Gen.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal of the Society of Chemical Industry	Jour. Soc. Chem. Ind.

Journals, &c.	Abbreviated title.
Journal S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
La Pomologie Française	Pom. Franç.
Le Jardin	Le Jard.
Lebensgeschichte der Blütenpflanzen Mitteleuropas	Lebens. d. Blütenpfl.
Mycologia	Mycologia.
Naturwiss. Zeitschrift Land und Forst.	Nat. Zeit. Land-Forst.
New Phytologist	New Phyt.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. König. Bot. Berlin.
Oesterreichische Garten-Zeitung	Oester. Gart. Zeit.
Orchid Review	Orch. Rev.
Orchis	Orchis.
Phytopathology	Phytopathology.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Quarterly Journal of Forestry	Quart. Jour. of Forestry.
Queensland Agricultural Journal	Qu. Agr. Journ.
Report of the Botanical Office, British Columbia	Rep. Bot. Off. Brit. Col.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard.
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.
Revue Horticole	Rev. Hort.
The Garden	Gard.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
Transactions Royal Scot. Arboricultural Soc.	Trans. Roy. Scot. Arbor. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc.†
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Woburn Experiment Farm Report	Woburn.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.
† The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

Abies firma. By A. Bruce Jackson (*Gard. Chron.*, Oct. 5, 1918, p. 137; with 2 figs.).—The twentieth of this series of critical notes on conifers. Gives the history, synonymy, and bibliography of this uncommon fir, and also dimensions of several specimens.—*E. A. B.*

Aesculus turbinata Blume. By W. J. Bean (*Bot. Mag.* t. 8713; June 1917).—A native of Japan. The Japanese Horse Chestnut somewhat similar to the European *A. Hippocastanum,* but having smaller capsules, warted instead of spiny. The leaves of *A. turbinata* are larger than any other species and in autumn turn a clear golden yellow.—*L. C. E.*

Allotment in Leeds and its Lesson. By A. G. Ruston, B.A., B.Sc. (*Jour. Bd. Agr.* xxv. No. 3, June 1918).—An account of an allotment divided into nine plots each 50 yards by 4 yards and cultivated by professional men. Only potatos were grown, but manurial and other conditions varied. The conclusions were as follows :—

It was more economical to give a medium dressing of dung and supplement with artificials than to give excessively heavy dressings of dung alone. Dressings at rate of 15 tons (with artificials), 57 tons, and 72 tons dung to the acre gave crops respectively at rate of 9, 10, and 11 tons per acre.

It pays to get reliable " seed " either direct or one year from Scotland. Selected " seed " of ' Up to Date ' yielded 20½ tons to acre, casually picked up " seed " 3·6 tons. Good " seed " of ' King Edward ' yielded 11·4 tons to the acre, seed from the market only 3·4 tons.

It pays to spray potatos. Approximately 2 tons an acre increase was given where spraying was done, although little blight was present on any plot.

If land is in need of lime, it must be applied in a fine state of division if it is to become incorporated in the soil. A dressing of lime in large lumps at rate of 8 tons to the acre was applied to one plot, and soil which had a lime " requirement " of 1 ton to the acre had only reduced its " requirement " by half.
G. C. G.

Amorphophallus Kerrii. By N. E. Brown (*Bot. Mag.* t. 8692; Jan. 1917).—A handsome warm-house Aroid from Siam with solitary, erect, glabrous, compound leaves over 4 feet 6 inches in length, and green spathes. The berries are blue.—*F. J. C.*

Angulosa Cliftonii Rolfe (*Bot. Mag.* t. 8700; March 1917).—Native of Colombia. A plant for the intermediate house, with large golden yellow flowers marked with red on petals. Distinguished from other members of the genus by the widely pouched base of the three-lobed lip.—*L. C. E.*

Aphis avenae, Aphis pomi, Aphis sorbi, Eggs of, Studies on the Morphology and Susceptibility of the. By Alvah Peterson (*Jour. Econ. Entom.* vol. x. Dec. 1917, pp. 556–569).—A close study of the egg showed that it is covered by three layers : an outer semi-transparent layer, which is brittle, an inner pigmented elastic layer, and an innermost layer which is thin, transparent, and surrounds the young nymph as it emerges. Certain changes take place previous to hatching which result in the partial rupture of the outer brittle layer. A critical period of a few days to possibly several weeks exists when the egg is much less resistant than usual. It is suggested that this is of considerable importance in the control of these aphids, and various experiments were conducted to ascertain the best killing agents. Lime-sulphur 1–8 plus ' Black Leaf 40 ' 1–500 gave the best results, up to 97 per cent. of the eggs killed. Good results were also obtained from carbolic acid and substances containing phenol derivatives. Crude carbolic acid (100 per cent.) 2 c.c. to 98 c.c. of solution plus soap 2 lb. to 50 galls. of water applied during the crucial period killed 93–100 per cent. of the eggs.—*G. W. G.*

Apple Blossom Weevil, A Parasite of (*Pimpla pomorum*). By A. D. Imms, M.A., D.Sc., and C. Morley, F.Z.S. (*Ann. Appl. Biol.* vol. iv. No. 4, March 1918; pp. 211–227; plates).—Life history and habits. Its efficiency as a parasite

in combating the ravages of the weevil is fully discussed. In its larval stage it attacks both larvæ and pupæ of the weevil. From 1270 apple buds infested by the pests at Chatteris (Cambs.) 27 per cent. were found to be effectively cleared by the parasite. It is suggested that measures involving the preservation and increase of the latter should be given adequate trial, as it is in France. It appears to be a valuable accessory means of controlling the weevil.
R. C. S. R.

Apple Identification by Means of Flowers, Leaves and Wood. By J. Farrell (*Jour. Agr. Vict.* Aug. 1917; pp. 457–469).—Each variety has the above distinct characteristics, as well as tree growth and fruiting habit in addition to the size, shape, colour, quality, and quantity of its fruit.

In 'sports,' the wood usually retains the characteristics of the original variety, although the fruit may differ. To show the difference in wood, yearling growths of twelve different varieties of apple are illustrated, showing relative strengths, habits of growth, and bud formation; varying from the straight wood of the 'London Pippin,' with its small and closely set leaf buds, through the various types to the long and partly spiral bending internodes of the 'King David' wood. Leaves of the same twelve varieties are also illustrated. Typical specimens are usually produced on the young wood, and irregular types are mostly found on the older growths; consequently the leaves do not form such a good means of identification as the fruit buds and bark. The flowers of a variety like its fruit, wood growth, leaves, &c., may vary somewhat, and in some this is more apparent than in others; nevertheless, when typical specimens are produced they afford an accurate means to correct identification. Photographic illustrations of the blooms of 216 varieties of apple growing in Victoria are given. No two varieties produce blooms alike, the main differences in their botanical construction being the relative lengths of the united styles above the nectary, the relative lengths of the free parts of the styles and of the stamens to their own pistil. Typical minor varietal differences may also be observed in the stigmas, anthers, sepals and petals.—*C. H. H.*

Apple Orchard Cultivation. By J. Farrell (*Jour. Agr. Vict.* Feb. 1918, pp. 80–88).—The cultivation usually consists of two ploughings a year, plus cultivators and harrows. The first ploughing is six to eight inches deep, done soon after the first autumn rains have fallen. The soil is drawn towards the trees on both sides, the furrows running with the fall of the land to carry away the surface water. In spring, after weathering, it is again ploughed and cultivated, but if rough and hard, it is worked with disc cultivators or harrows before the spring ploughing. In spring ploughing, the soil is drawn away from the trees and a level surface again obtained. Single and double-furrow ploughs are used with shifting handles and adjustable head-rack, making it possible to plough right up to the butts of the trees. (Illustrations are given of single and double-furrow orchard ploughs, one-horse spring cultivator, one-way extension disc harrow and orchard harness to avoid damage to trees.) A fine earth mulch which prevents the escape of soil moisture is obtained by the one-horse nine-tooth spring cultivator or the disc cultivator according to the nature of the soil.

For hard tenacious soil not amenable to the spring-tooth harrow, the disc cultivator is employed, so fixed as to cultivate up to the butts of the trees, both the horse and driver being out of the way of the limbs of the trees. The horse's harness is comparatively light and the steel tube forming the bow is held up by the hip straps, the traces being of leather, consequently no rough surface comes in contact with the trees. If the land is lumpy a heavy roller is used after the spring cultivator to reduce the soil to a fine condition. Better results are obtained by planting fruit trees on virgin soil and clean cultivation than by growing crops such as oats among the trees. If well manured and well cultivated, peas, beans, strawberries, &c., may be grown between the rows to bring in money before the trees come into bearing.—*C. H. H.*

Apple Orchards, Green Manuring for. By J. Farrell (*Jour. Agr. Vict.* March 1918, pp. 129–133).—Field peas (*Pisum arvense*) are recommended, sown broadcast and lightly manured with bone dust and superphosphate as soon as the late maturing apples have been gathered, or they may be sown in drills during the growth of the apples; the pea plants will be fit to plough in about the time the early flowering apples are in full bloom. Green manure should be buried to a depth of six or eight inches; this is best done by a two-furrow orchard plough with circular revolving coulters. These ploughs may if necessary be fitted with weed-burying attachments.—*C. H. H.*

Apple, Sterility and Cross-pollination. By J. Farrell (*Jour. Agr. Vict.* July 1917, pp. 385–403).—The dates of full bloom of 220 varieties of apple in seven districts of Victoria are given, also diagrams of the structure of the apple flower, and sections of the flowers of different varieties showing the relative position of the stamens to the pistils.

Medium temperatures, with occasional light showers, afford ideal conditions during the blooming period.

In orchards it is found advantageous to plant two rows of one variety, say of 'Yates,' then four rows of another variety, say 'Jonathan,' and so on, for inter-pollination. Insufficiency of liquid in the stigmas has been given as one of the probable causes of sterility. As a rule the larger the stigma the more fluid it contains. The late-blooming varieties, such as 'London Pippin' and 'Rome Beauty,' are often sterile if not inter-planted, but an orchard containing a mixture of these, other conditions being favourable, is usually most fruitful. Bees should be kept in a sheltered, warm corner facing the morning sun.

C. H. H.

Apple, Surface Inequalities and Blemish of the Rind. By J. Farrell (*Jour. Agr. Vict.* Oct. 1917, pp. 577–588).—The 'Jonathan' frequently produces freak-shaped apples due not to frost but abnormal construction of its blossoms. Sections of flowers and fruits are illustrated. Sometimes late blossoms of certain apples give fruits without pips, but with larger ovaries than normal; the membranous ovary walls are thicker and tougher than in normal apples. 'Gravenstein' often produces flowers with ovaries below the normal size. The author concludes that a coreless apple, if obtained, would be of low commercial value. The best and most shapely apples are produced from flowers of normal construction; if the filaments of the pistil are fewer in number than five or exceed that number the fruit tends to be imperfect. *Pyrus spectabilis* has as many as thirty-seven styles.—*C. H. H.*

Apple, The Production of New Varieties of. By J. Farrell (*Jour. Agr. Vict.*, Jan. 1918, pp. 16–24).—The testing of new varieties, varieties evolved through sports, the maintenance of varieties capable of supplying modern market requirements are discussed. Illustrations showing method of crossing blossoms, pips, seedlings, and the seedlings of different varieties compared are given, and a photograph of the apple 'Statesman' and its sport. Regrafting of varieties found unsuitable is fully dealt with.—*C. H. H.*

Apple, the Setting, Development and Ripening of the Fruit. By J. Farrell (*Jour. Agr. Vict.* Sept. 1917, pp. 542–553).—Illustrations of flower and fruit developing, and of the apples 'Jonathan,' 'King David,' 'Stewart's,' 'London Pippin,' 'Esopus Spitzenberg,' 'Buncombe,' 'Munroe's Favourite,' 'Rome Beauty,' 'McIntosh (Red),' 'Statesman,' 'Emperor Alexander' and 'Reinette de Canada.' Directions as to picking are given and autumn tint is considered.

C. H. H.

Apple Trees, A Study of the Capsid Bugs found on. By F. R. Petherbridge and M. A. Husain (*Ann. Appl. Biol.* vol. iv. No. 4, March 1918, pp. 179–205; figs).—Observations made at West Walton near Wisbech among badly attacked orchards, and in unattacked fruit plantations near Cambridge. Seven different genera and two species of one genus were collected. Eggs were laid, usually singly, in the current year's soft stem near the apex, and in some cases at the thickened bases of the twigs. Preference was shown for softened wounds. *Plesiocoris rugicollis* hatches after the apple buds have opened, from sixteen to seventeen days before full bloom. The young larvæ move to the tender, half-opened leaves and feed on them. The damaged leaves show characteristic brown spots. After moulting, the insects feed voraciously. In the Wisbech district it lives on willows, apples, and black currants, but it does not readily change its host. Control measures are necessitated by the enormous damage done. Spraying with soft soap and nicotine kills the bugs quickly, except in the egg stage. It is most effective when all the bugs have hatched, sprayed through a fairly coarse nozzle, pointing downwards, under high pressure.

R. C. S. R.

Apple Twigs, Notes on the Life History of Marmora elotella Busch, A Lepidopterous Sap Feeder in. By Stuart Vinal (*Jour. Econ. Entom.* vol. x. pp. 488–496, Oct. 1917).—This paper deals with a Tineina, the larvæ of which produce serpentine mines in the bark of apple twigs in Massachusetts. Very few layers of cells are destroyed, as the larva draws its sustenance from the plant sap. The sap feeders are considered a very highly specialized group and are probably of comparatively recent origin in the Lepidoptera. A full description of all stages is given and illustrated. The larva is about 5 mm. long and the adult has a wing expanse of 6 to 7 mm. The species causes hardly any injury to the cambium and is therefore of little economic importance.—*G. W. G.*

Apples, Date of Full Bloom and Date when Fruit is Picked. By J. Farrell (*Jour. Agr. Vict.* Sept. 1917, pp. 552–3).—List of fifty-eight different varieties, with number of days involved between flowering and fruit being ripe; the shortest length of time being 80 days for 'Gladstone,' 87 for 'Early Margaret' and 'William's Favourite,' 90 for 'Lord Suffield'; the longest being 227 days for 'Sturmer Pippin,' 216 'Rymer,' 214 'Dougherty,' 210 for 'Twenty Ounce' and 'Scarlet Pearmain.' The usual period of full bloom of the apple in Victoria is two to three days.—*C. H. H.*

Apples, Evaporation of. By J. S. Caldwell (*Jour. Agr. Vic.* October 1917, pp. 589–607; Nov., pp. 671–684; Dec., pp. 734–748).—The articles deal with: The kiln evaporator, its uses and limitations; construction of the building; two-kiln evaporator; double-walled ventilator; side elevation of four-kiln evaporator, showing ventilating openings in the wall, which permit free entrance of air beneath the floor of the work-room to the air inlets in the walls of the kilns; ground-floor plan; second story plan; section showing belt conveyor from grader to storage bin and chutes from bin to paring table; eight-kiln ventilator; power bleacher; plants for large capacity. Nov. 1917: Heating apparatus; piping system of furnace; section of building showing Jacket-and-Hopper construction; kiln floor; steam-heated kilns; the tunnel evaporator; furnace room; furnace; construction of trays. Dec. 1917: The Carson-Snyder "All-purpose" Evaporator; its drying chamber, power parer; evaporating machinery—paring machines, slicers, graders; other equipment; relation of temperature of the air to its moisture-carrying capacity; artificial means of increasing circulation of air; determining when the fruit is properly dried; grading and packing the dried fruit; best varieties of apple for evaporation; yield of dry fruit from different varieties.—*C. H. H.*

Apples, Jonathan Spot and Scald of, Effect of Temperature, Aeration, and Humidity on, in Storage. By C. Brooks and J. S. Cooley (*Jour. Agr. Res.* xi. pp. 287–318, Nov. 1917; plates).—Jonathan spot and scald are both at first restricted to the colour cells of the apple and both lay the fruit open to the attack of rot fungi. Both were decreased by good aeration when fruit was gathered in a mature condition and both increased with rise of temperature, having a maximum at about 30° C. and an optimum at 20° C. Only at 0° C. did scald develop in an open container; it increased rapidly in a moist atmosphere. Apples stored in an atmosphere with more than 5 per cent. CO_2 at 15° C. have not developed scald but have been destroyed in other ways. Apple-scald is more serious on green fruit than on ripe; apples delayed in storage, and well aerated during the delay, provided they are mature when picked, develop less scald. *F. J. C.*

Ash, Utilization of. By W. D. Sterrett (*U.S.A. Dep. Agr., Bull.* 523, June 1917).—Ash is one of the leading commercial hardwoods of the United States. Its importance is due to the intrinsic qualities of its wood; for the quantity cut annually and the available supply of standing timber are small in comparison with the output and supply of a number of other American hardwoods.

There are eighteen species of ash native to the United States, but 98 per cent. of the ash lumber produced is from three species—white ash (*Fraxinus americana*), black ash (*F. nigra*), and green ash (*F. lanceolata*).

Ash wood is heavy, strong, tough, stiff, and hard, and takes a high polish. It shrinks only moderately in seasoning and bends well when seasoned. The layers of annual growth are clearly marked by several rows of large, open ducts occupying (in slow-growing specimens) nearly the entire width of the annual ring. The medullary rays are numerous and obscure. The colour of the heartwood is brown; the sapwood is much lighter, often nearly white. The proportion of heartwood and sapwood varies chiefly with the age of the tree.

Ash is the second most important wood used in aeroplanes. The great bulk of the wood used is spruce from the Pacific Coast and West Virginia. The essential qualities needed in wood for aeroplanes are straightness of grain, strength, absolute freedom from hidden defects, lightness (in comparison with strength), and ability to stand extreme stress. Ash is used in framework, main outriggers on which the canvas is stretched, uprights bearing the engine or forming the engine beds, skids (on the upright, curving ends of which the alighting wheels are fixed), rudders, and propeller blades. For framework, outriggers, and uprights, straightness of grain and strength are the essential qualities needed, which usually can be best supplied by rapid-growing, comparatively young growth, from 75 to 150 years old. For propeller blades, for which ash is very largely used, the quality desired, in addition to strength in comparison with weight, is ability of the wood to hold its shape, which is best supplied by old-growth ash. Propeller blades are made from laminated blocks consisting of several layers of different kinds of wood glued and nailed together. An excellent combination is said to be a middle layer of ash with spruce on either side, then layers of mahogany on the spruce, and thin layers of ash on the outside. Engine blocks and frame ribs are also often laminated in construction, spruce and ash being combined to divide the stress.

Ash lumber is an extremely valuable wood for special uses. The supply of standing ash timber is becoming limited, and to maintain enough to meet the demand commercial growing of the ash is necessary.

The following are the uses for which standing ash timber containing various kinds of material is most suitable and profitable :—

1. Clear, rapid-growing second-growth timber of white, green, blue, and Biltmore ash. The wood is straight-grained and strong. Trees less than 15 in. in diameter are most valuable for fork, hoe, shovel, spade, and scythe handles, baseball mats, and singletrees and doubletrees. Trees 15 in. and over in diameter are valuable for the above uses and for boat oars, wagon tongues, lumber for bentwood, other parts in car and vehicle construction, and sporting and athletic goods.

2. Large, clear, old-growth ash timber of all species holds its shape well, and is especially valuable for dimension lumber (largely for re-sawing) for car and boat construction, interior finish, church, store, and office fixtures, vehicle and automobile bodies, and agricultural and musical instruments.

3. Crooked and knotty ash timber and small, slow-growing trees (such as are found on poor, thin soils producing weak wood) and the lower grades of ash lumber can best be used for butter-tub staves and heading, woodenware and novelties, chair and furniture stock, hames, and other uses in which short clear pieces, such as can be cut out from between knots, can be utilized.

4. Clear black ash timber over 15 inches in diameter, the supply of which is very limited, is especially valuable for butter-tub hoops, splints for baskets and chair bottoms, and for interior finish.—*A. D. W.*

Aster fuscescens Bur. et Franch. By J. Hutchinson (*Bot. Mag.* t. 8728; September 1917).—Native of Western China. A hardy perennial which ripens seeds freely in a herbaceous border. The flower heads are about 1½ inches across, the ray florets violet and disc florets yellow.—*L. C. E.*

Bacterio-toxins in the Soil, The Non-persistence of. By H. B. Hutchinson and A. C. Thaysen (*Jour. Agr. Sci.* vol. ix. Part 1; Aug. 1918).—The effect of partial sterilization of soil, either by heat or by mild antiseptics, on its fertility is well known, but the reason (or reasons) for it is not thoroughly established. Of recent years several experimenters have claimed to have obtained evidence of the existence of bacterio-toxins in the soil, and Greig Smith in particular, working with Australian soils, has concluded that such toxins are present in soil and adversely affect the number of bacteria. In connexion with work on Indian soils, C. M. Hutchinson, also, has assumed that toluene increases the fertility of soil by destroying its toxicity. The experiments of Greig Smith were made on very dilute sodium chloride extracts of the soil examined. These extracts, after being made germ-free by filtration, were divided into two portions, of which one was untreated and the other heated. They were then inoculated with the rather rare *Bacillus prodigiosus*. The results obtained showed a marked reduction after twenty-four hours in the number of cells in the untreated extract and an increase in the heated extract. It was inferred that the untreated extract contained toxins, that these caused the reduction in number of the bacteria, and that the act of heating the extract destroyed the toxins and thus allowed the organism to multiply.

The authors of the present paper decided that it was desirable to repeat these experiments on English soils, and six such soils were dealt with. The results were that in each case there was at first a reduction in the number of bacteria in the untreated soil, followed in three cases by recovery forty-eight hours after inoculation, after which increase in numbers took place. With extracts of the three remaining soils there was no such recovery. The latter would therefore appear to give some support to Greig Smith's conclusions. But if the falling off was due to toxins the heated extracts should have shown improvement. This was not so, however, for of the six soils the value of one extract was maintained but not increased, while the remaining five showed reductions in number of germs amounting, after seventy-two hours, to fourteen-fifteenths of those of the untreated extracts. Hence either lack of increase is not due to toxins, or, if it is so due, such toxins are not affected by heat. As regards soils extracted after treatment with toluene, large increases in the number of bacteria are found, but these increases the authors attribute not to a destruction of toxins by the antiseptic, but to the liberation by this treatment of soluble organic compounds. That lack of food substances must be a main factor in determining the bacterial increase is established by further experiments in which minute quantities of nitrogen in the form of peptone were added to the extract, with the result that there were very large increases in bacterial content. Another set of experiments, in which *Bacillus fluorescens liquefaciens* was substituted for the species used in the Australian experiments, showed at the end of seventy-two hours a very large increase of cells in all four cases, *i.e.* (1) untreated extract, (2) heated extract, (3) extract of toluened soil, (4) heated extract + peptone; so that the type of result obtained in this method of experimenting depends on the test organism employed, and the general conclusion at which the authors arrive is that there is no evidence to show that bacterio-toxins are likely to possess importance in the partial sterilization of soils.—*J. E. W. E. H.*

Beans, Varieties of, susceptible to Mosaic. By D. Reddick and V. B. Stewart (*Phytopathology*, viii. pp. 530–534, Oct. 1918).—The mosaic disease of beans is prevalent on many varieties and in many districts in the States. It appears to be transmissible through the seed, and apparently pollen from infected plants may transfer the disease to seeds produced by apparently healthy plants. If this be so the saving of seed from healthy plants will not alone prevent the continuance of the disease; the early elimination of affected plants from the seed beds must also be effected. There is evidence that resistant strains of some varieties exist. The disease results in the production of very small crops, and at times of none.—*F. J. C.*

Berberis aggregata Schneider. By T. A. Sprague (*Bot. Mag.* t. 8722; August 1917).—A native of Western China, perfectly hardy. It possesses the merit of being ornamental both when in flower and in fruit and is easily propagated by seed. Flowers pale yellow, fruits crimson and orange.—*L. C. E.*

Berberis candidula. By A. O. (*Irish Gard.* xiii. p. 153, Oct. 1918).—This is a new Chinese Barberry with dark green glossy leaves, attractive yellow flowers, and plum purple fruits. It is of low growing habit and suitable for the rock garden. It is by some known as a variety of *Berberis Wallichiana*, but is sufficiently distinct for ranking as a species.—*E. T. E.*

Berberis Stapfiana Schneider. By J. Hutchinson (*Bot. Mag.* t. 8701; March 1917).—Native of China, one of the Wilsonae type. The abundant seeds render its propagation easy. Fruit crimson, attaining its greatest beauty in October and November, later perhaps than any other Barberry.—*L. C. E.*

Brown Rot of Apples. By H. Wormald, M.Sc. (*Jour. Bd. Agr.* xxv. No. 3, June 1918).—An illustrated description of a disease which attacks apple trees, and produces on the fruit brown areas which gradually increase in size till the whole apple is infected. Small pustular swellings appear beneath the skin and burst through as yellowish, powdery outgrowths, usually in concentric circles. The diseased apples shrink in size, and skin becomes wrinkled. Under certain conditions which are not yet understood, stored apples affected by this disease turn black, the skin remaining smooth and bearing few or no pustules.

Diseased apples are a source of infection to other apples. The spores are carried by the wind and also by insects, and gain an entrance through cracks and injuries, producing the characteristic symptoms of "brown rot." Such apples may either fall to the ground or remain on the trees throughout the winter, becoming "mummied" apples. The autumn-formed spores either die or are washed away, but a fresh crop is developed the following summer and these infect the young fruit. On certain soft-wooded varieties (*e.g.* 'Lord Derby' and 'James Grieve') disease may extend through stalk of infected apple and enter fruiting spur and branch, causing a canker round the base of the spur. The disease can be controlled by removing diseased fruits and cutting away infected spurs.—*G. C. G.*

Bulbophyllum lilacinum Ridl. By R. A. Rolfe (*Bot. Mag.* t. 8723; August 1917).—A native of the Malay Peninsula and Siam. A distinct and attractive species, easily grown under tropical conditions. Flowers small, lilac with purple blotches.—*L. C. E.*

Campanula Ephesia Boiss. By N. E. Brown (*Bot. Mag.* t. 8715; June 1917).—A native of Asia Minor. A handsome Campanula for the cool greenhouse. Its nearest ally appears to be *C. tomentosa*, but *C. Ephesia* is of a more robust habit, the corolla is almost three times as wide as that of *C. tomentosa* and much less tubular in form.—*L. C. E.*

Castilleja miniata Dougl. By S. A. Skan (*Bot. Mag.* t. 8730; October 1917).—Scrophulariaceae, Native of North America. A hardy perennial flowering annually in June and easily propagated from seed. Flowers pink inside and greenish outside. This species is closely allied to *C. purpurascens* and appears to differ only in colour.—*L. C. E.*

Cherries, Self-sterility of. By I. Sutton (*Jour. Genetics*, vol. vii. pp. 281–300, August 1918).—By an oversight in our last issue in the abstract on this subject, p. 569, the varieties of Cherry 'Amber Heart,' 'Black Eagle,' 'Black Heart,' 'Black Tartarian,' 'Bigarreau de Schreken,' 'Noir du Guben,' 'Napoleon,' 'Jaboulay,' 'Frogmore Early,' 'Early Rivers,' 'Elton,' 'Governor Wood,' 'Guigne d'Annonay,' 'Kentish Red,' 'Toussaint,' 'Waterloo,' 'White Heart,' are said to be self-fertile. The word 'fertile' should read 'sterile,' as the researches reported upon indicate.—*F. J. C.*

Chirita Trailliana Forrest. By O. Stapf. *Gesneriaceae* (*Bot. Mag.* t. 8706; April 1917).—Native of South-west China. A perennial plant for the greenhouse, stem short and creeping, densely covered with reddish hairs. Inflorescence a few-flowered cyme, flowers opening in succession. Corolla tube pale violet with yellow lines in front inside, limbs bright violet.—*L. C. E.*

Chrysanthemum in China. By C. Harman Payne (*Gard. Chron.* Dec. 14, 1918, p. 233).—Refers to a chapter on this plant in a series of Memoirs by French Jesuit Missionaries to China, published 1778. It is important as giving the earliest European account of the history and cultivation of the plant in China.—*E. A. B.*

Clematis Fargesii var. Souliei Franch. By J. Hutchinson (*Bot. Mag.* t. 8702; March 1917).—Native of China. A climbing shrub, hardy, and easily propagated from seed. Flowers pure white tinged outside with yellow.—*L. C. E.*

Coccidae affecting various Genera of Plants, A List of. By E. E. Green, F.Z.S., F.E.S. (*Ann. Appl. Biol.* vol. iv. No. 4; March 1918, pp. 228–239).—Continuation of list referred to in these Abstracts, vol. xl.—*R. C. S. R.*

Cockroaches, Destruction of, A Suggestion for the. By C. W. Howard (*Jour. Econ. Entom.* vol. x. Dec. 1917, pp. 561).—Recent successful attempts to kill bed bugs in dwelling houses by superheating makes the possibility of killing cockroaches by the same system feasible. It was found that an exposure to temperatures between 122° F. and 140° F. for twenty minutes killed 100 per cent. Temperatures below 120° F. gave variable results. The practical application of this knowledge is of considerable difficulty owing to the habit of the cockroach hiding in cracks, &c.—*G. W. G.*

Coconuts. By C. F. Kinman (*U.S.A. Exp. Stn., Porto Rico*, Nov. 1916, pp. 25–28).—The effect of a fertilizer containing 6 per cent. nitrogen, 8 per cent. phosphoric acid, and 12 per cent. potash on the coconut palm is not apparent during the first two years, but an application of 20 lb. per tree of such a mixture resulted in an increased yield of nuts amounting to 60 per cent. in the third year.—*S. E. W.*

Corylopsis Willmottiae Rehd. & Wils. By W. J. Bean. *Hamamelidaceae* (*Bot. Mag.* t. 8708; April 1917).—A native of Western China. A hardy deciduous shrub. Flowers yellow, very fragrant, borne on pendulous spikes carrying about twenty flowers.—*L. C. E.*

Cotoneaster Franchetii. By Dublin (*Irish Gard.* xiv., Jan. 1919, p. 6).—One of the newer Cotoneasters, with attractive orange red fruits. An evergreen well worth growing.—*E. T. E.*

Cotoneaster salicifolia var. rugosa Rehd. and Wils. By W. J. Bean (*Bot. Mag.* t. 8694; Jan. 1917).—Discovered by E. H. Wilson in W. Hupeh, 1907. Differs from type in having broader, duller leaves with lower surface as well as young shoots covered with coarse, woolly pubescence. Flowers dullish white, in corymbs 1–2 in. wide, June; fruits bright coral red, globose or ovoid.—*F. J. C.*

Cryptophoranthus Dayanus Rolfe. (*Bot. Mag.* t. 8740; December 1917.)—Native of Colombia. A remarkable Orchid which thrives well in the tropical house. Flowers large, straw coloured with brown blotches.—*L. C. E.*

Cucumber Leafspot caused by Stemphylium cucurbitacearum n.sp. By Geo. A. Osner (*Jour. Agr. Res.* vol. xiii. No. 5, April 1918, pp. 295–306; 4 plates).—During the summers of 1915 and 1916 a peculiar leafspot disease of cucumbers was observed at Plymouth, Ind., and Bowling Green, Ohio. The spots varied in size from 0·2 to 1·5 mm., and were circular or angular in outline. The centre of the spots was light yellow brown with a reddish brown border. From these spots a fungus of the genus Stemphylium was isolated. This was found to attack the leaves of cucumbers, gourds, and allied plants. No data regarding this disease has been published, and the author believes it to be a new species and has given it the name of *Stemphylium cucurbitacearum*. It is found that the fungus develops best when the weather is cool and when moisture is abundant; it can survive the winter, and is distributed by wind, rain, insects, &c. Bordeaux mixture is of value in the control of the disease, and this with suitable cultivation and destruction of attacked plants should be followed as normal control measures.
A. B.

Cycnoches chlorochilon. By R. A. Rolfe (*Orch. Rev.* xxvi. p. 211, fig.).—An illustration of the female flower of this fine species, together with its history. It differs from the male in having an extremely short stout column with triangular fleshy wings, and it is remarkable that the male was well known for upwards of half a century before the other sex appeared. The seeds from such a flower may number nearly four millions, as was estimated from the contents of a capsule taken from an imported plant.—*R. A. R.*

Cycnoches ventricosum. By R. A. Rolfe (*Orch. Rev.* xxvi. pp. 189–191).—The history of a species which was so completely confused with *C. Egertonianum*, Batem. (now known to belong to another section of the genus), that inflorescences of the two are shown by Bateman as produced by the same pseudo-bulb. It was an error of the artist, who instead of showing the female flower of *C. Egertonianum* introduced the males of the earlier *C. ventricosum*, and it was not until the phenomena were repeated at Kew that the secret of the mistake was discovered. Some further confusion between *C. ventricosum* and *C. chlorochilon* is pointed out, and it is shown that a real female of *C. ventricosum* and a sketch of the same are preserved in Dr. Lindley's Herbarium at Kew.—*R. A. R.*

Cymbidiella, The genus. By R. A. Rolfe (*Orch. Rev.* xxvi. pp. 57–59, fig. 6).—A paper showing that the three epiphytic Cymbidiums from Madagascar form a distinct genus, whose characters are given, together with the history of the three species, *C. flabellata*, *C. Humblotii* and *C. rhodochila*, with a figure of the latter. *C. rhodochila* grows naturally in clumps of the fern *Platycerium*, at an elevation of 1,800 to 2,000 feet, and has proved exceptionally difficult to cultivate. *C. Humblotii* grows on the stems of the palm, *Raphia madagascariensis*. A fine specimen of *C. Humblotii* is figured in the same volume.—*R. A. R.*

Cytisus albus, Link. By O. Stapf (*Bot. Mag.* t. 8693; Jan. 1917).—Native of Spain and Portugal. A well-known plant, first introduced about 1739, and again in 1770. Flowers usually white, but sometimes flushed with pink. The illustration shows the pink form.—*F. J. C.*

Daphne Giraldii Nitsche. By O. Stapf (*Bot. Mag.* t. 8732; October 1917).—Native of China. A hardy shrub with glabrous golden yellow flowers. It is sometimes confused with *D. tangutica* Maxim., a species having persistent leaves and bracteate inflorescences.—*L. C. B.*

Disanthus cercidifolia Maxim. By W. J. Bean. *Hamamelidaceae* (*Bot. Mag.* t. 8716; June 1917).—Native of Japan. A hardy shrub, whose chief value lies in the rich autumnal tints of its foliage. It does not often flower in this country and in the absence of seeds may be propagated by layers.—*L. C. E.*

Douglas Fir, Bark-Beetles infesting the. By W. J. Chamberlin (*U.S.A. Exp. Stn., Oregon, Bull.* 147, Jan. 1918).—There is in the United States at the present time about 2,200 billion feet of standing coniferous timber, of which 30 per cent., or 650 billion feet is Douglas Fir, *Pseudotsuga taxifolia*. This is the dominant tree of Oregon, and is destined to be the leading commercial tree of the future.

No other commercial tree of importance has such a wide range. Its magnificent size, high commercial value, rapid growth, as well as the ease with which it lends itself to silvicultural management, make it an ideal tree with which to deal.

At the present time it is estimated that the Douglas Fir pitch moth causes damage which reduces by 15 per cent. the amount of No. 1 clear material obtained from Douglas Fir, in parts of the Rocky Mountain region. Elsewhere timber beetles, borers, and bark-beetles cause an immense loss of mature timber and also kill off the younger trees.—*A. D. W.*

Eupatorium urticaefolium poisonous. By C. D. Marsh and A. B. Clawson (*Jour. Agr. Res.* xi. pp. 699–715, Dec. 1917; plates).—Confirms experimentally the suspicion that *Eupatorium urticaefolium* is poisonous to stock.—*F. J. C.*

Experiments in Field Technic in Rod Row Tests. By H. K. Hayes and A. C. Arny (*Jour. Agr. Res.* xi. pp. 399–419; Nov. 1917).—Discusses the effect upon yield and growth of a variety in proximity to another variety in the same kind, and shows that in certain circumstances the effect may be a significant one. *F. J. C.*

Forest Entomology, The Practical Aspect of. Part IV. By W. Adkin (*Quar. Jour. For.* xii. pp. 80–98. April 1918).—The Pine Beetle. *Hylurgus piniperda* is perhaps the second most dangerous pest in coniferous woods. It is capable of so persistently boring the growing shoots of older pine trees that in time the trees may succumb to its attack. It may also attack young pine trees and reduce them to the condition of misshapen bushes. The beetle is inconspicuous, black-brown, blunt-headed, about $\frac{1}{5}$ inch long. It often may be found in the twigs into which it has bored, even after they have been blown off the tree. The beetle breeds beneath the bark, and prefers felled, dead or sickly trees or branches, but apparently is capable of breeding in comparatively sound stems if no other material is available. In most parts, pine logs which have been left lying about for some time contain many borings, which may easily be seen by stripping the bark.

Vigorous growth throughout the rotation of a crop of trees is of importance to our subject for two reasons:—

1. Most of the insects, which devour the leaves of trees or bore into the bark or wood, prefer those trees which are sickly or of weakly growth to those which are in healthy and vigorous growth.

2. Trees which are strong, healthy, and of rapid growth recover more readily from insect attack than do trees which are weakly and grow slowly.—*A. D. W.*

Forests of Porto Rico; Past, Present and Future, and their Physical and Economic Environment. By L. S. Murphy (*U.S.A. Dep. Agr., Bull.* 354, Oct. 1916).—Porto Rico consumes over three times as much wood annually as it produces. Great quantities of timber have been cut or burned by the "conuco" to make clearings, which are abandoned after a few years and become waste. The charcoal burner still destroys the young growth needed to keep up the forest. These practices are rapidly reducing the forests, and failure to develop and utilize them fully in a scientific manner has already brought about a shortage in the domestic supply of wood and consequent hardship to the people.

Porto Rico is very sparsely wooded. The impenetrable forest jungles, commonly associated with the West Indies, are scarce. With the exception of those in the Sierra de Luquillo, they are in the more inaccessible parts into which few except the 'jibaro' ever penetrate. Around almost every habitation, however, there are groups of such trees as the bread-fruit and mango; and numerous scattered single trees, mostly palms. The protective cover of shade trees of the coffee plantations gives a decidedly forested appearance to many localities.

The mangrove is of considerable economic importance, furnishing fuel, especially to the bakeries, from its limbs and branches, and posts and house piling from the submerged parts. For the latter uses it is very highly prized because of its resistance to decay and to the attack of the white ant. The bark contains a tanning material and a dye, though to what extent it is used locally is not known.

There is at least one native industry of large proportions that might possibly produce its own box material through the practice of forestry—the cigar industry. At present the cedro used by the Porto Rican trade comes almost exclusively from the virgin forests of Cuba. This wood is particularly prized for its lightness, clearness of grain, and strong, yet pleasant aroma. It is, of course, largely conjectural how far these properties would inhere in the wood of a planted growth. The cedro is a rapid grower under favourable conditions of soil and climate.—*A. D. W.*

Fruit Bottling without Sugar (*Queensland Agr. Journal*, Aug. 1917, p. 69).—Warm bottle well in oven, then fill with fruit, pour boiling water till it is as full as it can be. Put back in oven and leave until the bottle begins to boil again. Take out and put on rubber ring and screw top, previously well warmed. Stand jar on its head until cold, give an extra "screw" if necessary. This method has been found very successful for plums and nectarines.—*C. H. H.*

Fruit Nomenclature (*Jour. Agr. Vict.* Aug. 1917; pp. 482–493).—The following rules are considered urgent in the naming of fruit by the Pomological Committee of Australia. (1) The name shall be as simple as possible. (2) Wherever possible one word only should be used as a name. (3) Duplication of names, and the use of names possessing strong similarity, are to be avoided. (4) Such words as "seedling" and "hybrid" shall be abolished from Australian pomology as far as possible. (5) Priority of name shall have preference wherever possible.—*C. H. H.*

Fruit Trees, Insects injurious to. By H. W. Davey (*Jour. Agr. Vict.* Feb. 1918, pp. 101–107).—The insects are grouped as follows :—

1. Chewing insects that feed on exposed leaf surfaces. *Examples.*—Pear and cherry slug, pumpkin beetle, and most caterpillars. *Treatment.*—Spray with arsenate of lead.

2. Chewing insects that are exposed for only a short time. *Examples.*—Codling moth, light brown Apple Moth. *Treatment.*—Arsenical sprays. Picking affected fruits and bandaging.

3. Chewing insects living in tunnels eaten out by them in stems or branches. *Example.*—Cherry and Peach Borer caterpillar. *Treatment.*—Spraying is of very little or no value. Inject carbon bisulphide into tunnel and plug up entrance with soft clay.

4. Chewing insects that move freely about and often feed at night. *Example.*—Weevils. *Treatments.*—Oil sprays when trees are dormant, and tobacco.

5. Suctorial insects, more or less permanently fixed to their host plant. *Example.*—Scale insects. *Treatment.*—Oil sprays or fumigation with hydrocyanic acid gas.

6. Suctorial insects that move about on branches. *Examples.*—Aphides, Red Spider. *Treatment.*—Oil sprays when trees are dormant, and tobacco sprays when trees are active.

7. Suctorial insects that are free-moving and active fliers. *Examples.*—Rutherglen and other plant-feeding bugs. *Treatment.*—Phenyl sprays.

8. Fly maggots infesting fruit. *Examples.*—Fruit flies. *Treatment.*—Destroy infested fruit by boiling, keep soil beneath trees well stirred. Spraying is of no value.

This classification is followed by life-histories of the various insects with treatment also of fungus diseases.—*C. H. H.*

Fruit Trees, Planting of. Anon. (*Jour. Bd. Agr.* xxv. No. 8, Nov. 1918).—A list of varieties of fruit trees which have proved themselves generally to be most suitable for allotments and small gardens. The season and suggested times for marketing are given. The fruits mentioned are apples (22 varieties), pears (10), plums (5), damsons (5), raspberries (2), black currants (3), red currants (1), gooseberries (8), strawberries (3), and loganberry.—*G. C. G.*

Grapes, Winter Injury of. By F. E. Gladwin (*U.S.A. Exp. Stn., Geneva, N.Y., Bull.* 438; 8 plates).—Poor drainage predisposes out-door vines to injury by frost, as it tends to induce immaturity of the grape tissue. Excess of water in the tissue and immaturity during late summer and autumn are co-related. Immaturity is favoured by excessive or late application of nitrogenous manure. Severe pruning after injury by frost in spring induces rank growth and consequently tends to the destruction of buds. Certain species of grapes resist low temperatures better than others.—*S. E. W.*

Grapevine Aphis, Life History of Macrosiphum illinoisensis. By A. C. Baker (*Jour. Agr. Res.* xi. pp. 83–89, Oct. 1917; figs.).—The grape aphis lays its eggs on *Viburnum prunifolium.* They hatch in early April and adults migrate to vines in early May, returning to the Viburnum in October. Descriptions and figures of the different stages are given.—*F. J. C.*

Grevillea oleoides Sieb. By J. Hutchinson (*Bot. Mag.* t. 8741; December 1917).—Native of New South Wales. A shrub for the conservatory, nearly allied to *G. punicea.* Flowers bright carmine, thinly silky outside.—*L. C. E.*

Home Grown Seeds. By A. F. Pearson (*Irish Gard.* xiii. p. 134, Sept. 1918).—Deals very briefly with the ways in which the amateur gardener can save his own seeds.—*E. T. E.*

House-Fly (Musca domestica L.), The Effect of certain Chemicals upon Oviposition in the. By S. E. Crumb and S. C. Lyon (*Jour. Econ. Entom.* vol. x. Dec. 1917, pp. 532–536).—The writers conducted a series of experiments with house flies, to learn what substances in horse manure were capable of inciting them to oviposit. Their conclusions do not agree with Richardson (*Bull.* 292

N. Jersey Agr. Exp. Stn. Feb. 1916), but the authors believe the apparent discrepancy to be due to a misinterpretation by Richardson of his own experiments. They found that carbon dioxide was the inciting substance and not ammonia as stated by Richardson. A comparison of the total number of eggs laid under similar conditions expressed as "per cent. of total unit average" between CO_2 and ammonia gives the figures 91·4 against 8·6. The controls compared with CO_2 in the same way show very similar results, 92·4 to 7·6.—*G. W. G.*

Hybridization and Cross-fertilisation of Flowers. By J. Heal (*Gard. Chron.* Jan. 18, 1919, p. 25).—A very interesting record of successes and failures in crosses achieved and attempted between a great number of plants. Many of the experiments were between distinct genera. Many Begonia, Primula and Anthurium crosses are given.—*E. A. B.*

Hydrocyanic Acid Gas as a Soil Fumigant. By E. R. de Ong (*Jour. Agr. Res.* xi. pp. 421–436, Nov. 1917; plates).—The use of hydrocyanic gas as a soil fumigant is restricted on account of the damage it does to plants and seeds of the amount retained by clays, and the difficulty and slowness of diffusion in wet soils. It may be used in "masses of loose, porous soil, especially those with only small amounts of clay, or of seed beds and potting soil. Such treatments allow of much wider range of concentrations when the soil is not occupied by a crop." Hydrocyanic acid does not therefore appear to be a suitable fumigant for use outdoors. The amounts of sodium cyanide required for an acre varied very much in different soils, viz. from 483 lb. in a gravelly soil to 3,030 lb. in a clay loam where Phylloxera on vines was the pest aimed at, and the gas was required to penetrate to a depth of 3 feet.—*F. J. C.*

Hydrocyanic Acid, Greenhouse Fumigation with. By W. Moore and J. J. Willaman (*Jour. Agr. Res.* xi. pp. 319–338, Nov. 1917; plates).—Tomato plants fumigated with hydrocyanic acid absorb more or less of the gas; the immediate effect of the presence of this poison is reduction in oxidase and catalase and therefore in respiratory activity, followed by stoppage of photosynthesis and translocation of carbohydrates and closing of stomata. The cell-walls become more permeable, leading to less rapid intake of water from stem and greater loss through cuticle, so that wilting follows. Where fumigation is mild, recovery is more or less rapid, and oxidase activity returns to normal, while catalysis exceeds normal and respiration may remain above normal for some time. Other functions somewhat slowly regain normal, but may in time exceed it, and increased growth may occasionally follow.—*F. J. C.*

Insect Injury, Prevention of (*Quart. Jour. For.* July 1918).—The Council of the Arboricultural Society desire to draw attention to the very serious risk of the increase of destructive forest insects in consequence of the extensive fellings that are going on all over the country. Mr. M. C. Duchesne, in the last issue of the Journal, indicated preventive measures in the case of the pine Weevil, but there are many other injurious insects that are likely to become exceedingly abundant unless precautions are taken. Species of *Pissodes*, notably *P. pini* and *P. notatus*, the Pine Beetle (*Hylurgus piniperda*), the Ash Bark Beetle, and the Elm Bark Beetle, are cases in point. These all breed in the top and lop and in the stools of felled trees, and from these breeding places the new broods make their way to growing trees, which they may severely cripple and ultimately destroy. The best way to prevent their increase is to see that all brushwood is burned not later than April of the year succeeding the autumn or winter of felling. As far as possible the fires should be made on the stools, for in this way the latter may be made to a large extent unsuitable for the insects breeding. To leave brushwood lying in the woods during the summer is a most reprehensible practice, which might very well be the subject of a Government Order.

Light and Air in Relation to Tree Growth.—Light and air are the dominating factors of tree growth. Trees, like animals, must feed and breathe in order to live: the tree-food consists of two kinds—water and gas. Water is absolutely essential for the life of the tree, both as a direct food and as a medium to convey inorganic food from the soil to the leaves. Of the organic elements, the carbon is obtained from the carbonic acid gas absorbed by the leaves from the air together with some oxygen, while the rest of the oxygen and the nitrogen and other elements are obtained from the soil in the form of nitrates, phosphates, or sulphates dissolved in water.

If trees of good girth are required at the end of the rotation, after this first weeding out it is necessary to assist them by thinning. This may have to be done at any time from ten to twenty-five years old, depending on the species and rate of growth. This operation should be very light, because if the trees are opened out much at this stage, coarse and branchy timber will result. If the plantation is pure coniferous, the operation is comparatively simple, for all suppressed and confined trees should be cut out, due care being taken not to break up the canopy. If the crop is of mixed conifers and hardwoods, the more valuable trees should be given somewhat more room by cutting out some of the less valuable that are pressing on them. The slower-growing valuable species must be assisted against those that are quicker-growing and less valuable, while extra large individuals of a branchy nature should be kept in close confinement.

If the wood is thinned too much in its early life, it will, in the course of time, if left alone, recover to a certain extent, provided the trees are in a healthy condition. The writer has seen an almost pure wood of sycamore about thirty years old, which some ten years previously had been very heavily thinned, with the result that the trees became very branchy.

Trees on the edges of woods are naturally always inclined to branch on their exposed sides, but if the wood happens to be affected with the larch aphis or larch canker fungus (*Peziza Willkommii*) these trees will almost always be healthy and free from infection. This implies that these diseases are not prevalent when the trees are given plenty of air and light.—*A. D. W.*

Laeliocattleya × elegans. By R. A. Rolfe (*Orch. Rev.* xxvi. 1918; pp. 252-254).—A chronological history of this well-known natural hybrid from the time when it was originally described as a species of Cattleya, in 1848, until it was raised artificially by Mr. E. F. Clark, from *Cattleya Leopoldii* × *Laelia purpurata*, over sixty years later. The history of its long confusion with another natural hybrid, now known as *Laeliocattleya* × *Schilleriana* Rolfe, and which has been raised artificially from *Laelia purpurata* × *Cattleya intermedia*, by Mr. Chas. Morrow, is also given.—*R. A. R.*

Lead Arsenates, Stone Fruits, and the Weather. By Geo. P. Gray (*Jour. Econ. Entom.* vol. x. pp. 385–392, Aug. 1917).—The two types of commercial lead arsenate are discussed. The acid type (lead hydrogen arsenate, often labelled "Standard") is the stronger and quicker acting, but is not so safe in use as the basic lead arsenate (usually labelled "Neutral"). The latter is the one to be recommended whenever an arsenical is mixed with others to form a combination spray; and should also be used in humid regions and upon all stone fruits. Acid lead arsenate would be selected in more arid regions, and for use on foliage not peculiarly susceptible to spray injury.—*G. W. G.*

Lettuce Anthracnose caused by Marssonina Panattoniana. By E. W. Brandes (*Jour. Agr. Res.* vol. xiii. No. 5; pp. 261–280; 2 plates).—The symptoms of the disease are distinct lesions on the leaf blade and midrib. This causes much dwarfing and wilting of the leaves. The organism (*Marssonina Panattoniana*, *M. perforans*) has been proved to be the cause of this disease. The author finds that the spores produce germ tubes in about six hours and can penetrate through the epidermis. Germination of the spores cannot take place above 32°C. The spores can withstand desiccation on glass for only four days. The fungus cannot grow at temperatures above 30°C., the thermal death-point being 40° for ten minutes. A short bibliography is appended. (See JOURNAL R.H.S. xxxvii. p. 541.)—*A. B.*

Lettuce, Some Bacterial Diseases of. By N. A. Brown (*Jour. Agr. Res.* vol. xiii. No. 7, May 1918; pp. 367–388; 14 plates).—Two new bacterial diseases of the lettuce are described. One occurs in South Carolina and Virginia, while the other was found in Kansas. The first attacked the stems and the roots, while the Kansas disease attacked chiefly the leaves. An infectious bacterium was isolated from the attacked plants, and the name *Bacterium vitians* (n.sp.) is suggested. The group number 211.3332523 of the Society of Bacteriologists' Chart is assigned to the organism.

The Kansas disease is attributed to *Bacterium marginale* (n.sp.), with a group number 211.2323123 of the Chart.

Bacterium marginale causes decay of the margins of the inner whorls of leaves of immature plants, but occasionally the infection spreads over the whole leaf surface. The organism is mobile, possessing one or two polar flagella, is Gram-negative and not acid-fast; may be grown readily in most of the commoner media, and can retain its vitality for more than one year.

Bacterium vitians is not actively motile, and may occur singly, in pairs, or in short chains. It is Gram-negative and is not acid-fast. The growth of the organism was most pronounced on potato cylinders, where it formed a bright yellow slimy growth. Beef bouillon and litmus milk were also favourable media for prolonged growth.—*A. B.*

Litchi. By J. E. Higgins (*U.S.A. Exp. Stn., Hawaii, Bull.* 44; 9 figs.).—The Litchi is a native of China. It prospers in a deep, moist alluvial soil and needs an abundance of manure. The Litchi is easily raised from seed, which germinates quickly. As the seeds soon lose their viability, they should be preserved by enveloping them in a mixture of damp sphagnum and powdered charcoal and keeping them in a tin tube. Propagation is more usually effected by layering, or by grafting on the Longan (*Euphoria longana*). The seedlings have been known to fruit in five years, but frequently twenty years are required before they come into bearing. The fruit is liable to attacks by the larvæ of the moths *Cryptophlebia illepida* and *Archips postvittanus*. The remedy is spraying with lead arsenate. The roots of the trees are frequently attacked by mealy bug.

The Litchi is also subject to erinose due to a species of mite (*Eriophyes*). Spraying with a solution of 10 oz. of nicotine sulphate, and 1¾ lb. of whale oil in 50 gallons of water is an efficient remedy.—*S. E. W.*

Lupines as Poisonous Plants. By C. D. Marsh, A. B. Clawson and H. Marsh (*U.S.A. Dep. Agr., Bull.* 405; 10 figs.).—Many sheep have been killed by eating lupines, as the alkaloids present in the lupine are poisonous. The alkaloid is not a cumulative poison, so sheep are able to eat a certain amount of the plant with impunity, but when hungry sheep are grazed on fields where lupines are abundant danger arises. Well-fed sheep would incur no risk in such a pasture.—*S. E. W.*

Maize for ripening in England. By Prof. R. C. Punnett (*Gard. Chron.* Jan. 11, 1919, p. 13; with fig.).—Records of successful crops grown in 1914 and succeeding years. The strain used being raised by Prof. Biffen from two kinds, called Gehu and Eighty-day White. Of other varieties tried, Yellow Flint yielded the heaviest crop. Recommends the trial of such maizes by smallholders.—*E. A. B.*

Manganese, Occurrence in Insect Powders. By C. C. McDonnell and R. C. Roark (*Jour. Agr. Res.* xi. pp. 65–76, Oct. 1917).—It has been reported that manganese occurs in the flower-heads of *Chrysanthemum cinerariaefolium* of both Dalmatian and Japanese origin, but not in the flower-stems. The authors show that it occurs also in the flower-stems and that its occurrence is therefore no guide to the detection of adulteration.—*F. J. C.*

Manures, Decomposition of Green and Stable. By R. S. Potter and R. S. Snyder (*Jour. Agr. Res.* xi. pp. 677–698, Dec. 1917).—The general conclusions are that (1) addition of lime causes more rapid decomposition (and therefore greater availability) of soil organic matter; (2) the addition of stable or green manure (oats and clover) to the limed soil causes the more rapid decomposition of the total organic matter, but the addition of lime lessens the decomposition of the added matter considered alone; (3) all the manures tended to conserve lime; (4) the addition of stable manure did not increase the rate of decomposition of green manure in unlimed land and only slightly in limed land; (5) there is not a great difference in the rate of decomposition of green manure added dry in a finely pulverized condition, and that added in a relatively coarse state.
F. J. C.

Maurandia Purpusii T. S. Brandegee. By S. A. Skan (*Bot. Mag.* t. 8697; Feb. 1917).—Discovered by Mr. Purpus in Mexico, and introduced through Darmstadt to Kew 1912. A tuberous perennial, perhaps hardy in dry situations, with ascending or prostrate stems, 3-4 feet long, triangular leaves about 1½ in. long and solitary axillary flowers, bright rose purple about 1½ in. long and about an inch across at the slightly two-lipped mouth.—*F. J. C.*

Megacarpaea polyandra Benth. By O. Stapf. (*Bot. Mag.* t. 8734; November 1917).—Cruciferae. Native of the Himalayas. A hardy perennial which, however, does not flower very freely in this country. Its nearest ally is *M. bifida*, but the two species are easily distinguished by their leaves, the segments of which are toothed in *M. polyandra* and entire in *M. bifida*. Inflorescence a large panicle, flowers yellowish white, fruits winged, tawny when ripe.—*L. C. E.*

Mesembryanthemum Pillansii De Wild. By N. E. Brown (*Bot. Mag.* t. 8703; March 1917).—Native of South Africa. An undershrub, will grow well under conditions suitable for other members of the genus. *M. Pillansii* can be distinguished from all other members of the genus by its long spathulate petals. The outer petals are purple with a white filiform claw, the inner petals are white, filiform, sharply incurved over the stamens.—*L. C. E.*

Mesembryanthemum simulans. By N. E. Brown (*Gard. Chron.* Oct. 12, 1918, p. 145; with fig.).—Records the punctuality of the daily opening and closing of flowers, and provides the first complete description in English.—*E.A.B.*

Myrsine africana Linn. By N. E. Brown (*Bot. Mag.* t. 8712; May 1917).—A native of Africa, India, and China. A hardy evergreen shrub, very ornamental when in fruit. It is, however, strictly diœcious, and unless both sexes are grown, the beauty of the female plant when in fruit will not be realized. The fruit is a shining globose berry, violet purple.—*L. C. E.*

Nicotine on Sprayed Plants, How to test for the Presence of. By V. I. Safro (*Jour. Econ. Entom.* vol. x. pp. 459–461, Oct. 1917).—The author states the general belief that as soon as a nicotine spray dries on the leaf it disappears, and proceeds to detail a test which shows this assumption to be incorrect. The test consists in taking a number of leaves which have been sprayed and thoroughly rinsing them in a minimum of distilled water. In some of the tests, where five leaves gave a doubtful reaction, ten leaves gave a definite one; but as a rule five leaves in 25 c.c. of water showed a definite indication of the presence of nicotine, where the usual spray strength had been used. After having rinsed thoroughly, filter and make filtrate slightly acid with a few drops of hydrochloric acid. If a precipitate is formed at this point filter again. To filtrate add several drops of 1 per cent. silicotungstic acid. A white cloudiness denotes presence of nicotine. It is not stated how long after spraying the tests were made.
G. W. G.

Nitrate-Nitrogen, some Factors affecting its Accumulation in Soil. By P. L. Gainey and L. F. Metzler (*Jour. Agr. Res.* xi. pp. 43-64, Oct. 1917).—The authors show that the aeration in uncultivated soil is far in excess of that necessary to maintain aerobic conditions. They conclude that some factor other than increased aeration is at work in promoting nitrification in cultivated soils.—*F. J. C.*

Nitrifying Bacteria, The Effects of, on Solubility of Calcium Phosphate. By W. P. Kelley (*Jour. Agr. Res.* xii. March 1918, pp. 671–683).—The author finds that the addition of $CaCO_3$ produced no immediate effect on the solubility of soil calcium or that added as calcium phosphate. No increase in the solubility in water of the soil phosphates or of calcium phosphate was produced by bacterial action, except in the nitrification of ammonium sulphate when added without calcium phosphate. The addition of calcium carbonate brought about an increase in soluble calcium, but tended to lower the solubility of calcium phosphate. Calcium carbonate also promoted more active nitrification than calcium phosphate.

A short bibliography is appended.—*A. B.*

Nitrogen-assimilating Bacteria, Influence of Nitrates upon. By T. L. Hills (*Jour. Agr. Res.* xii. Jan. 1918, pp. 183–230).—The general conclusions were: Small quantities of potassium, sodium, and calcium nitrates caused a great increase in the number of Azotobacter in sterilized soils. Ammonium nitrate in the same quantities caused a less-marked increase. Higher concentrations were not so favourable to the growth of the organisms.

Potassium and sodium nitrates caused an increase in amount of nitrogen assimilated by the Azotobacter on agar films. Calcium nitrate in the same amounts brought about a decrease in the amount of nitrogen fixed to a point even below that representing the amount assimilated in the absence of nitrates. In soil cultures, sodium and calcium nitrates caused an increase in total nitrogen, which was more marked in the unsterilized cultures than in those cultures sterilized and inoculated with a pure culture of Azotobacter.

Under aerobic conditions Azotobacter in liquid cultures reduced nitrate to nitrite but not to ammonia. More atmospheric nitrogen was assimilated in the presence of nitrate than in the absence of this salt.

The number of *Bacillus radicicola* in sterilized soil was increased by addition of small quantities of potassium, sodium, ammonium, and calcium nitrates. This increase was not so marked as in the Azotobacter cultures. *B. radicicola* appeared much more resistant to higher concentrations of nitrates than Azotobacter. In liquid cultures, all three nitrates caused a large increase in the amount of gum obtained by precipitation with acetone.

Large quantities of nitrates proved detrimental to the formation of nodules on alfalfa. The plants grown in presence of large amounts of nitrate did not produce nodules when inoculated with a viable culture of *B. radicicola*. Nitrates in soil cultures prevented the re-formation of nodules once removed and also caused a decrease in number of nodules already present.

A good bibliography is appended.—*A. B.*

Nitrogen Fixation, Influence of Plant Residues on. By H. B. Hutchinson (*Jour. Agr. Sci.* vol. ix. Part 1; Aug. 1918).—In the experiments on which this paper is based the author confirms and extends the conclusions arrived at by a number of workers in the last twenty years on the processes involved when various carbohydrates decompose in the soil. The work of Hall showed that land at Rothamsted allowed to revert to prairie conditions showed considerable accumulations of nitrogen. This accumulation might be due to a variety of causes, viz. (1) leguminous plants in the herbage, (2) absorption of ammonia or nitric acid from the air, (3) transference of nitrates by capillary uplift from the permanent subsoil water, (4) activity of nitrogen-fixing organisms, particularly *Clostridium Pasteurianum* and *Azotobacter chroococcus*, which are widely distributed in the soil and assimilate nitrogen energetically under suitable conditions of aeration, of temperature, and of food supply. As these organisms are not green they depend for their energy on the decomposition of carbohydrates into simpler compounds. Such carbohydrates may be sugar and starch, or may be derived from straw, green manures of all kinds, and so on.

Koch and his collaborators, studying the action of sugar, found that doses of the carbohydrate added to soil produced a proportionate increase of nitrogen content in the soil up to 2 per cent. of the weight of soil treated. Beyond this the rate was diminished, the reduction being probably due to concentration of sugar and of available nitrogen compounds in the soil. In Mauritius, in Java, and in the Leeward Islands molasses has long been used with good results as a manure for the sugar cane, and it has been experimentally determined that those soils, so manured, had a higher nitrogen content. On the other hand, the application of saccharine matter to the soils of British Guiana and elsewhere has not always promoted fertility.

The author's experiments throw light on this discrepancy. He applied sugar, at the rate of one ton to the acre, each year from 1906 to 1911 to barley ground. The application was made at Rothamsted on land which had been continuously manured with complete mineral fertilizers (but not with nitrogen) for fifty years. When the sugar was applied in the early autumn the yields of straw and of grain showed increases of 20 to 50 per cent. as compared with the controls; but when applied in January, February, or March the yield was decreased. The essential importance of phosphates as an adjunct to carbohydrate manuring was also confirmed. Pot experiments were made with barley, using sugar, starch, or finely ground hay as a source of carbohydrate, and in these experiments it was found that the carbohydrate caused a large increase in the number of soil bacteria followed by a decrease (not permanent, however) in nitrate nitrogen. Now this diminution in nitrate might conceivably be due to ordinary denitrification (*i.e.* loss of nitrogen, in the gaseous form, to the atmosphere), but it is much more likely to be due to increase of protein, in the form of the substance of the bacteria, for it is known that many micro-organisms can build up their own proteins from nitrate. Ultimately, of course, as the bacteria die the protein reverts to nitrate.

The interpretation of the results, then, appears to be that when sugar, starch, straw, or green manures decay in the soil two sets of changes take place, one set being favourable to nitrogen formation and fertility, the other detrimental. Which of these two sets of changes predominates depends on the kind and quantity of the material supplied, the temperature, the interval which elapses before the crop is introduced, and the presence of specific organisms. Broadly speaking, if the crop is introduced immediately after the incorporation of the carbohydrate in the soil, and especially if the temperature remains low, a reduced yield may be expected. The practical conclusion to be drawn is that straw, green manure, leaf-mould, turf, and so on should be applied in autumn rather than in spring, and in any case well in advance of planting and further that when large applications of such are made there should also be an application of phosphate.—*J. E. W. E. H.*

Odontoglossum chiriguense Reichb. By R. A. Rolfe (*Bot. Mag.* t. 8725; September 1917).—Native of Central America. This plant thrives well in a house where Miltonias are grown, the ordinary Odontoglossum house being too cold in winter. Its nearest ally is *O. coronarium*, but is easily distinguished by its larger and more undulate flowers. Flowers yellow conspicuously blotched with brown.—*L. C. E.*

Odontoglossum platycheilum Weathers. By R. A. Rolfe (*Bot. Mag.* t. 8718; July 1917).—Native of Guatemala. A species which will grow well under conditions suitable for *O. crispum.* Flowers showy, rose-coloured, lip blotched with carmine.—*L. C. E.*

Okra or Mallow Caterpillar (Cosmophila erosa Hubner), The Life History of. By H. L. Dozier (*Jour. Econ. Entom.* vol. x. Dec. 1917, pp. 536–542).—This insect has been known since 1882 but has not previously been considered of much importance. It has, however, recently been recorded as doing serious damage to Okra (Deccan Hemp), and, although, feeding mostly on *Hibiscus* sp., has been found attacking cotton in Florida. *Cosmophila* should be closely watched as a possible pest of cotton, as its range extends from Massachusetts and Montreal to Kansas and southwards through Mexico and the Antilles to South America. It also occurs in South Africa and in the Oriental and Australian regions. It feeds mostly on the leaves, but also eats out the flower buds of *Hibiscus*. The article is illustrated with two plates.—*G. W. G.*

Ophryses hybrid. By R. A. Rolfe (*Orch. Rev.* xxvi. pp. 82–83, 102–103).—An account of three artificial hybrid Ophryses raised by M. Fernand Denis, Balaruc-les-Bains, France, two of which prove the parentage of natural hybrids, viz. *O.* × *Macchiattii*, Camus (*aranifera* × *speculum*), and *O.* × *quadriloba*, Camus (*aranifera* × *lutea*). The cross *O. speculum* × *bombyliflora* is believed to be new and is described as *O.* × *Fernandii*, Rolfe. Others included in the paper are *O.* × *Grampinii*, Cartesi (*tenthredinifera* × *aranifera*), previously raised by M. Denis, and *O.* × *fallax*, Rolfe (*Grampinii* × *bombyliflora*). The latter is a secondary hybrid, and two others have also been raised, *O.* × *Grampinii* × *speculum*, and *O.* × *Grampinii* × *lutea*. These hybrids are interesting, because they illustrate what is probably taking place in nature. M. Denis has also reproduced *O. arachnitiformis* by self-fertilization.—*R. A. R.*

Orchids in Costa Rica. By C. H. Lankester (*Orch. Rev.* xxvi. pp. 128 and 256).—Notes of Orchids in their native homes and the conditions under which they grow. The author is an observer and cultivator who has had much experience with Central American Orchids.—*R. A. R.*

Orchids, Natural Hybrid. By R. A. Rolfe (*Orch. Rev.* xxvi. pp. 229–231).—A summary of Dr. Lindley's remarks under the question "Do Orchidaceous plants produce mules?" It is shown that as long ago as 1797 the hybrid origin of *Orchis* × *suaveolens* (now known as *Gymnigritella* × *suaveolens*, Camus) was suggested by Villars.—*R. A. R.*

Orchis folioso-maculata. By R. A. Rolfe (*Orch. Rev.* xxvi. pp. 125–126, 151).—The history of a spontaneous hybrid which originally appeared in the collection of Mr. C. Wolley Dod, and afterwards in that of Sir A. Buchan-Hepburn, where the two species were grown together. The latter was called *O.* × *Hepburnii* Druce, and it was recorded as a hybrid from *O. foliosa* and *O. latifolio-maculata*, but examples of the parents from Sir A. Buchan-Hepburn show that the second parent was *O. maculata*.—*R. A. R.*

Orchis maculata superba. By R. A. Rolfe (*Orch. Rev.* xxvi. pp. 177–179).—What has long been known as the Kilmarnock Orchis is now extensively grown, and is shown to be a natural hybrid between *O. latifolia* and *O. maculata*, and identical with the one known as *O.* × *Braunii* Halacsy. Numerous localities for it are given, and it is shown that what is known as *O. latifolia Bartoni*, D. Moore, is a form of the same.—*R. A. R.*

Orchises, British Marsh. By R. A. Rolfe (*Orch. Rev.* xxvi. pp. 162–166).—On the three British Marsh Orchises, *O. latifolia*, *O. incarnata*, and *O. maculata*, and their hybrids, *O.* × *Aschersoniana*, Hausskn. (*incarnata* × *latifolia*), *O.* × *ambigua*, A. Kern. (*incarnata* × *maculata*), and *O.* × *Braunii*, Halacsy (*latifolia* × *maculata*). Incidentally it is shown that the plant called *O. praetermissa* Druce is the Marsh Orchis with broad unspotted leaves which can be traced back to 1597, when it was figured by Gerard. To this the name *O. latifolia* is assigned, while the spotted-leaved plant often called *O. latifolia* is referred to *O.* × *Braunii*. Details of the old figures are given.—*R. A. R.*

Oreocharis Forrestii Skan. (*Bot. Mag.* t. 8719; July 1917.)—Gesneriaceae. A native of China. A free-flowering plant, resembling *Ramondia pyrenaica* in habit, but not yet proved to be hardy. Flowers pendulous, full yellow.—*L. C. E.*

Oresitrophe rupifraga Bunge. By R. A. Rolfe (*Bot. Mag.* t. 8726; September 1917).—Saxifragaceae. Native of North China. A small rock plant, nearly allied to Astilbe, not yet proved hardy in this country. Flowers small, white or pale rose. In autumn the leaves turn a brownish purple.—*L. C. E.*

Orthrosanthus chimboracensis Baker. By C. H. Wright (*Bot. Mag.* t. 8731; October 1917).—Iridaceae. Native of Mexico and Peru. The nearest ally of this genus is *Sisyrinchium*, from which it differs by having free filaments. *O. chimboracensis* grows well in a cold greenhouse and sets seed freely. Flowers lavender blue.—*L. C. E.*

Peppermint Oil, The Effect of Cultural and Climatic Conditions on the Yield and Quality of. By F. Rabak (*U.S.A. Dep. Agr. Bur. Pl. Ind., Bull.* 454, Dec. 9, 1916; 16 pp.; 7 tables).—The peppermint plant, *Mentha piperita* L., is extensively cultivated as the source of a volatile oil used as a flavouring and therapeutic agent. The value depends much upon the composition. The principal ester constituent, menthyl acetate, possesses a very fragrant minty odour, to which the agreeable aroma of the oil is largely due. The alcoholic constituent, menthol, possesses the well-known penetrating minty odour and characteristic cooling taste. The flavouring properties of the oil are due largely to both the ester and alcoholic constituents, while the medicinal value is attributed to the latter only. Plants were grown under various conditions during the years 1908 to 1912, and the following conclusions were arrived at.

Conditions of soil and climate are influential factors in the formation of the oil. Light sandy or loamy soils appear to be the most favourable for the production of an oil of high quality.

The yield of oil distilled from fresh plants apparently decreases as the plant matures. Drying the plant before distillation results in a considerable loss of oil. The largest proportion of oil is found in the leaves and flowering tops.

The percentage of esters in the oils increases as the plants approach maturity. The menthol content of the oil bears a close relationship to the ester content. The free acidity and ester content of the oil distilled from dry plants is considerably higher than in the oil from fresh plants. The drying of the plants causes changes favourable to esterification, while the percentage of free and total menthol in oils distilled from dried plants is also uniformly high.

The formation of esters and menthol takes place most readily in the leaves and tops of the plant, the metabolic processes showing increased activity as the plant matures.

The effect of shade upon the plant is to decrease esterification and the formation of menthol, and is due possibly to the lessened activity of the elimination of water by the plant.

The action of frost noticeably increases esterification and the formation of menthol.—*F. G. A.*

Phaius grandifolius in Panama. By R. A. Rolfe (*Orch. Rev.* xxvi. pp. 219–220).—An account of the discovery by Mr. C. W. Powell of this well-known Chinese species in Panama. The circumstances of its introduction are not known, but it is shown that the species is now thoroughly naturalized and abundant in Jamaica.—*R. A. R.*

Pheasants and Agriculture. By Miss A. F. C.-H. Evershed (*Jour. Agr. Sci.* vol. ix. Part 1; Aug. 1918).—At the request of the East Anglian Game Protection Society, the author examined the contents of the crops of 311 pheasants supplied by members of the society month by month throughout the year 1914. Full details are given of the roots and stems, weed leaves, weed seeds, flowers, agricultural seeds and insects found in each crop. In the words of the author, "119 crops contained cereal grains or agricultural seeds of some sort, but a careful consideration of them seems to reduce the real cases of injury to 12 birds, there being good evidence in the remaining cases that the corn was either hand-fed or picked up in stubble. The damage done by pheasants to growing agricultural crops seems almost negligible."—*J. E. W. E. H.*

Pilea Forgeti N. E. Br. (*Bot. Mag.* t. 8699; Feb. 1917).—This new species was introduced by Messrs. Sanders' collector, Mr. L. Forget, from Venezuela in 1914. The plant is dwarf with broadly lanceolate leaves, beautifully coloured with longitudinal stripes of various shades of green and bronze, and reddish beneath. The female flowers are inconspicuous, but the small staminate flowers are borne in dense many-flowered clusters on erect peduncles about 3 in. long. A tropical-house plant.—*F. J. C.*

Pine District, Entomological Notes on the Surrey. By B. W. Adkin, F.E.S. (*Quar. Jour. For.* xi. pp. 217–237, Oct. 1917).—*Sirex gigas* L., the Giant Wood-wasp, has larvæ which bore into the stems of pine and fir trees, especially if the trees are sickly. The species is not very common, but is widely distributed and frequently occurs in the Surrey Pine District.

S. juvencus L., the Steel-blue Wood-wasp, another wood-boring species, is recorded in many books as a common British insect. These records appear to be erroneous, for the Rev. F. D. Morice states that he knows of only two specimens of this insect that are British born, both of which were captured in Yorkshire and no doubt emerged from imported timber.

S. cyaneus F., which figures in some collections as *S. juvencus*, is an American insect, the occurrence of which in England may be accounted for by the importation of timber containing its larvæ from Canada or the United States.

S. noctilio F. is a British species, which is frequently, though erroneously, identified as *S. juvencus*. *S. noctilio* differs from *S. juvencus* by having entirely black antennæ. It is widely distributed and not uncommon in Britain, and is frequently found in the Surrey Pine District.—*A. D. W.*

Pine in Oregon, Western Yellow. By Thornton T. Munger (*U.S.A. Dep. Agr., Bull.* 418, Feb. 1917).—Western yellow pine lumber is used for almost every purpose to which any pine lumber is put. Through central and eastern Oregon, western yellow pine is the most abundant timber tree, and is superior to most of its associates for the large variety of purposes for which it is used. Many houses in Oregon are built entirely of yellow pine, even the shingles, floors, and trimmings. Besides what is used within the State for buildings, railroad structures, fencing, and construction purposes, Oregon exports a large amount of the better grades each year-especially for building. Much of the lower grade material is manufactured into boxes, and large quantities go to California for fruit boxes. Yellow pine makes excellent fuel, for which both the green and the dead timber is used.

Western yellow pine is in many ways similar to long-leaf pine (*Pinus palustris*) of the South Atlantic and Gulf States, which is so valuable as a source of naval stores—turpentine and rosin. Recent experiments in turpentining western yellow pine in Arizona and California show that its yield of turpentine and rosin is very similar to that of the south-eastern pines, comparing very favourably with that from *P. palustris*. The season of flow was four or five weeks shorter in Arizona than in Florida, the yield of " gum " being about four-fifths as large for equal periods.—*A. D. W.*

Pine Trees of the Rocky Mountain Region. By G. B. Sudworth (*U.S.A. Dep. Agr., Bull.* 460, May 1917).—This bulletin describes and figures the distinguishing characters of all of the pines of the Rocky Mountain region, and gives graphic illustrations of their range and of their forest habits.

Of the 70 known species of pines, 36 inhabit the United States, and 14 occur in the Rocky Mountain region. Six of these occur also in the Pacific Slope region, and one ranges eastward from the Rockies in Canada into the Atlantic Coast country.

White Pines.—Western White Pine (*Pinus monticola* Douglas); Limber Pine (*P. flexilis* James); White-bark Pine (*P. albicaulis* Engelmann); Mexican White Pine (*P. strobiformis* Engelm.); Mexican Pinon (*P. cembroides* Zucc.); Pinon Nut Pine (*P. edulis* Engelm.); Single-leaf Pine (*P. monophylla* Torr. & Frem.); Bristle-cone Pine (*P. aristata* Engelm.).

Yellow Pines.—Arizona Pine (*P. arizonica* Engelm.); Western Yellow Pine (*P. ponderosa* Laws.); Apache Pine or Arizona Long-leaf Pine (*P. apacheca* Lem.); Chihuahua Pine (*P. chihuahuana* Engelm.); Lodgepole Pine (*P. contorta* Loud.); Jack Pine (*P. Banksiana* Lamb.).—*A. D. W.*

Pinus tuberculata Gord. By O. Stapf (*Bot. Mag.* t. 8717; July 1917).—A native of Western North America. The "knob-cone" pine. A remarkable feature of this species is the indefinite persistence of its tightly closed cones the seeds imprisoned by the scales retain their vitality for many years.—*L. C. E.*

Pisum, Inheritance Studies in. IV. By O. E. White (*Jour. Agr. Res.* xi. pp. 167–190, Oct. 1917).—The relation of thirty-five pairs of genetic factors in culinary peas to one another is discussed. The modifying effects of the expression of one factor upon another, and the effects of external environmental conditions on the expression of these factors, as far as is known, are presented. Data indicating freedom or linkage of different characters in inheritance are given.—*F. J. C.*

Plagiospermum sinense forma **brachypoda** Oliv. By O. Stapf (*Bot. Mag.* t. 8711; May 1917).—A native of Manchuria. A hardy shrub, flowers orange yellow, arranged among the leaves of the shorter branches.—*L. C. E.*

Plane-tree Disease, Report of Conference on. (*Jour. Agr. Vict.* July 1917 pp. 443–447.)—A fungus disease, known as *Gloeosporium nervisequum* on leaf and *Myxosporum valsoideum* on branch, having attacked the trees in the cities, a conference of scientific and lay representatives from over thirty municipalities in Victoria met to discuss remedial measures.

Recommendations as to treatment of affected trees were:

1. That all diseased trees be heavily pruned early in winter, and all affected shoots and branches be burned forthwith.

2. That leaves from such trees should be collected as soon as possible after falling and burned. As the spread of the disease is most probable through the agency of affected leaves, this recommendation is most important.

3. That the trees, after being pruned, should be sprayed with Bordeaux mixture during winter, and again when growth begins in spring.

4. That it is essential for the control of this and other diseases of trees that adequate spraying machinery should be provided for the purpose.

5. That all nursery trees be carefully inspected prior to planting.—*C. H. H.*

Pleione Pricei Rolfe (*Bot. Mag.* t. 8729; October 1917).—Native of Formosa. A plant which thrives well in the tropical house, with flowers lilac or rosy lilac with a whitish lip, which is blotched with pale brown and ornamented with yellow keels.—*L. C. E.*

Pollinia of Orchids. By R. A. Rolfe (*Orch. Rev.* xxvi. pp. 194–198).—A review of the structure of the pollinia of orchids from the simple pollen grains of the ancestral Apostasiae to the highly complex arrangement in the higher groups where the grains are not only aggregated into pollinia, but further united to a portion of the rostellum, known as the stipes and gland, which all come away together when an insect visits the flower. The rostellum is a modified stigma, yet it is retained in the male flowers of Catasetum, showing the anomaly of a female organ first losing its proper function and assuming another, and becoming an adjunct to the male pollinary apparatus; finally, on the sexes qecoming separated, remaining as an essential part of the organization of the male flower. It is given as a beautiful illustration of the working of Natural Selection through a long series of beneficial modifications.—*R. A. R.*

Polygonum Griffithii Hook. By C. H. Wright (*Bot. Mag.* t. 8724; August 1917).—Native of Northern India and Western China. A good perennial for the rock garden, quite hardy, but fails to mature seed. *P. Griffithii* closely resembles *P. sphaerostachyum*, but its flower spikes are smaller and on longer peduncles. Flowers deep crimson with buff-coloured bracts which form an effective contrast.—*L. C. E.*

Potato Leaf-roll: its Diagnosis and Cause. By E. J. Wortley (*Phytopathology*, viii. pp. 507–529, Oct. 1918; figs.).—Leaf-roll is prevalent in potatos in Bermuda as well as in many other districts. The author reports sixty varieties to have been seen attacked. Several other troubles have been confused with this, but he regards as a most important diagnostic character the rolling of one or more of the *lower* leaves. The rolling may be only the slight upturning of the leaf margins or may be cylindrical. The affected leaf is yellowish, especially the apical portion of the terminal leaflet, and the texture is hard and crisp, the affected leaves remaining rigid during drought. The whole plant is smaller, yellower especially during dry weather, has shorter stolons, and gives a much smaller yield than normal plants. The disease is transmissible by planting tubers from affected plants. He regards the disease as being the product of climatic conditions, especially drought, and gives a number of observations and experiments in support of his claim. He considers that soil-infection plays no part in the propagation of the disease, but does not appear altogether to reject Quanjer's hypothesis (see JOUR. R.H.S. xlii. p. 505) of the disease having origin in the attack of a specific organism, for he reports that certain experiments carried out on Prince Edward Island prove that the progeny of healthy parents that have grown near diseased plants develop leaf-roll.—*F. J. C.*

Potato Diseases, Resistance to. By G. H. Pethybridge (*Jour. Dep. Agr. Ireland*, xviii. Dec. 1918).—The varieties Great Scot, Provost, Kerr's Pink, Dominion, and Burnhouse Beauty, resistant to wart disease, proved susceptible to ordinary blight, pink rot, and canker (*Spongospora subterranea*).—*F. J. C.*

Potato Seed Experiments. By T. C. Johnson and J. T. Rosa (*U.S.A. Exp. Stn., Norfolk, Virginia, Bull.* 24).—The largest potato crop was obtained from 1·8 oz. tubers planted whole. Cut seed potatos sprout more quickly than whole potatos. For early crops, 'Irish Cobbler' gave the best results. *S. E. W.*

Potato Spraying. By G. H. Pethybridge (*Jour. Dep. Agr. Ireland*, xviii., Dec. 1918).—Comparisons of the results of spraying with 1 per cent. and 2 per cent. solutions of Burgundy mixture on different varieties of potato are given. The results were sometimes in favour of the higher, sometimes of the lower strength. Frequent sprayings were much more effective than single ones.—*F. J. C.*

Potatos, an Infestation by a Midge. By Edith M. Patch (*Jour. Econ. Entom.* vol. x. pp. 472–473).—A record of a Chironomid larva tunnelling near the surface of potato tubers is reported from Roxie, Maine. The State Department of Agriculture examined a barrel of these potatos but did not succeed in breeding the midge. A specific determination was, therefore, impossible, but Dr. O. A. Johannsen believed them to be *Camptocladius* sp. A plate accompanies the record showing larva and damaged tubers.—*G. W. G.*

Primula nutans Delavay. By J. Hutchinson (*Bot. Mag.* t. 8735; November 1917).—Native of Yunnan. A hardy Primula for the rock garden, but which dies after flowering; it sets seed quite freely, however, and can be easily propagated. This species is easily confused with *P. penduliflora* but differs in foliage. Inflorescence white, mealy towards the top, flowers nodding, violet.—*L. C. E.*

Prunus subhirtella var. **autumnalis** Miq. By W. J. Bean (*Bot. Mag.* t. 8733; October 1917).—Native of Japan. A Cherry which comes into flower in October and continues until December. Flowers white, fragrant, inclined to be double. *L. C. E.*

Pyracantha crenulata var. **yunnanensis** (*Irish Gard.* xiv. Jan. 1919, p. 6).—A little-known free, spring-flowering shrub, useful for covering a wall; bears bright crimson fruits in winter.—*E. T. E.*

Pyrola bracteata Hook. By S. A. Skan (*Bot. Mag.* t. 8710B; May 1917).—A native of North America. A plant very similar to *P. uliginosa*. In *P. bracteata* the petals are longer and narrower and the anthers are greenish yellow instead of purple.—*L. C. E.*

Pyrola uliginosa Torr. By S. A. Skan (*Bot. Mag.* t. 8710A; May 1917).—A native of North America. A hardy perennial plant growing in sphagnum swamps. Flowers nodding, fragrant, bright reddish purple outside, pale rose inside, anthers purple.—*L. C. E.*

Quercus densiflora Hook. and Arn. By S. A. Skan (*Bot. Mag.* t. 8695; Jan. 1917).—Discovered by D. Douglas probably in California. A rare tree in England, transplanting badly. Evergreen. Catkins long and Castanea-like. Acorn with thick woody shell; cup densely red-velvety within, clothed outside with long silky scales.—*F. J. C.*

Raspberry Anthracnose Disease. By W. H. Burkholder (*U.S.A. Exp. Stn., Cornell, Bull.* 395, Nov. 1917; figs.).—This disease attacks canes, leaves, and pedicels of raspberry and allied plants. Small, reddish-purple spots are first seen, enlarging slowly, finally producing cracks, which in the second season may extend to the pith. The disease is due to the fungus *Plectodiscella veneta* (*Gloeosporium venetum*), which is fully described. Inoculation experiments were carried out. Red varieties are said to be very resistant. Care should be taken not to plant diseased canes. The results of spraying are doubtful, but suggest that Bordeaux mixture may be effective in checking the disease. *F. J. C.*

Rhododendron Cuffeanum Craib. By J. Hutchinson (*Bot. Mag.* t. 8721; August 1917).—A native of Burma, but not yet proved hardy in this country. The inflorescence is in the form of terminal umbels of about five flowers. The corolla is tubular, long and white with a yellow blotch on the upper side within. *L. C. E.*

Rhododendron discolor Franch. By J. Hutchinson (*Bot. Mag.* t. 8696; Feb. 1917).—From W. Hupeh, introduced by E. H. Wilson to Arnold Arboretum 1908, thence to Kew. A fine species 6–8 feet high, with glabrous leaves grey below, and large, fragrant, white flowers with glabrous filaments and densely glandular style. Flowering in mid-June, the latest of its class, and starting late into growth. Apparently perfectly hardy.—*F. J. C.*

Rhododendron Fargesii Franch. By J. Hutchinson (*Bot. Mag.* t. 8736; November 1917).—Native of China. A showy plant, but, flowering as it does in April, its flowers are liable to damage by late frosts. Flowers pink in bud, rose-coloured when open.—*L. C. E.*

Rhododendron neriiflorum Franch. By J. Hutchinson (*Bot. Mag.* t. 8727; September 1917).—Native of Yunnan. A dwarf shrub, perfectly hardy and easy to grow. It can be easily distinguished from other species of the section to which it belongs by the underside of the leaves, which are slightly reticulate and pinkish glaucous. The flowers vary in shade from deep rose to crimson scarlet, the corolla tube is pouched at the base and has a ring of purple patches. *L. C. E.*

Rhododendrons. By E. J. P. Magor (*Gard. Chron.* Jan. 11, 1919, p. 15).—Among notes on other plants grown at Lamellen, N. Cornwall, are descriptions and records of flowering of many new Chinese and some hybrid Rhododendrons. *E. A. B.*

Root-fungi of Orchids (*Orch. Rev.* xxvi. pp. 4–7, 29–31, 55, 135).—A summary of the question of the Mycorrhiza of orchids and method of culture, by Bernard and others, with a recipe of the materials used, also an account of the recent method of inducing the germination of orchid seeds by means of a nutrient solution. The highly specialized seeds of Orchis seem to contain an insufficient store of nutriment to carry them over the initial stages of germination, and have contracted a habit of relying on the assistance of the root fungi. The possibility of supplying the deficiency by means of a nutrient fluid affords interesting possibilities for the future.—*R. A. R.*

Roses, Diseases of. By L. M. Massey (*U.S.A. Hort. Soc., Mass. Trans.* 1918, pp. 81–101; plates).—Black spot (due to *Diplocarpon rosae*, of which *Actinonema rosae* is a stage) is started by inoculation from diseased fallen leaves (which should be collected and burned), and Bordeaux mixture or lead arsenate (10 parts of powder)—sulphur (90 parts finely ground) mixture applied dry, are recommended as sprays. Powdery mildew (*Sphaerotheca pannosa*) was also kept in check by the lead arsenate-sulphur dust spray. Crown-canker is a disease caused by the fungus *Cylindrocladium scoparium*. The disease starts by a slight discoloration of the bark, the colour deepens to black, and the tissues appear water-soaked. Later, these spots encircle the shoot, and cracks are produced extending to the wood, the stem swells at and above this spot, and the cracks deepen and become more evident. The tree generally lingers for a long time, producing poor and few blossoms. No control measures have so far been devised. Crown gall, due to *Bacterium tumefaciens*, is frequent on roses, but no cure is known. Prevent infection of soil by planting only healthy plants.—*F. J. C.*

Roses, The Use of Commercial Fertilizers in Growing. By F. W. Muncie (*U.S.A. Exp. Stn. Illinois, Bull.* 196, Feb. 1917, pp. 511–564; 1 illus., 24 tables, 37 figs.).—Describes experiments in growing first-year roses in a greenhouse during 1910–15. The varieties grown were 'Bride' and 'Killarney,' half the plants of each being own-root stock and half being grafted.

Grafted stock more than paid for the increase in initial cost by its larger production during the first year.

No benefit was obtained from the use of potassium sulphate.

A definite relation was found to exist between the variation in hours of sunshine and the subsequent production of flowers.

A decrease in production resulted from mixing ground limestone with the soil, whether or not acid phosphate had been added. If needed for sweetening the soil, and for preventing the growth of algae, make a top-dressing of finely ground limestone at the rate of 10 lb. per 100 square feet of bench space.

Acid phosphate gave a greatly increased production with all types used in the experiment except grafted 'Brides.' Use generous quantities in the soil, *i.e.* at the rate of 4 to 8 tons to the acre in the field, or in a compost with soil at the rate of 40 to 80 lb. per 100 cubic feet of soil.

Keep up the nitrogen content of the soil by turning under green or farm manure before use. Liquid manure containing nitrogen should be used sparingly—only during sunshiny weather and chiefly during periods of heavy production. Dried blood in amounts exceeding 8 lb. per 100 sq. feet of bench space was found to cause a decrease in production with all except own-root 'Killarneys.'

Brown silt loam, the type of soil at the Illinois Station, will not produce a maximum crop of roses without fertilization.—*F. G. A.*

Rubber Trees, Fungus Disease of (*Ustulina zonata* (*Lev.*) *Sacc.* on *Hevea brasiliensis*). By A. Sharples, A.R.C.S., D.I.C. (*Ann. Appl. Biol.* vol. iv. No. 4, March 1918; pp. 153–178; figs.).—Contains a history of pests and diseases in rubber plantations. Experiments in inoculation with *U. zonata*; sources and means of infection: treatment, and outlines for future research.—*R. C. S. R.*

Rubus illecebrosus Focke. By R. A. Rolfe (*Bot. Mag.* t 8704; April 1917).—Native of Japan. The Strawberry-Raspberry, a Rubus with a herbaceous stem, attaining a height of about eight inches in summer and dying down to the ground in winter. Its fruits are large and scarlet, and flowers white. It is quite hardy and grows well in loamy soil, and is easily propagated by seeds or by division of the old plants. *R. illecebrosus* was for a long time treated as an alpine form of *R. rosaefolius* despite its herbaceous habit.—*L. C. E.*

Rust, Dissemination of White-Pine Blister. By G. F. Gravatt and G. B. Posey (*Jour. Agr. Res.* xii. pp. 459–462; Feb. 1918).—The authors attribute the spread of the aecidio-spores of *Cronartium ribicola*, the pine-rust, to the gipsy-moth larvæ which are often blown great distances (up to twenty miles) by the wind. To this they ascribe the appearance of the fungus upon currant bushes far from the place where *Pinus Strobus* or other pine liable to attack is growing. [This curious distribution has been noticed in Britain, although the means is still obscure.]—*F. J. C.*

Sarcochilus solomonensis Rolfe. (*Bot. Mag.* t. 8737; November 1917.)—Native of the Solomon Islands. A plant which grows well under conditions of great heat and moisture, in habit resembling a *Phalaenopsis*. Inflorescence a long slightly pendulous raceme, flowers small, pale buff with small brown spots. *L. C. E.*

Saxifraga manshuriensis Komarov. By M. L. Green (*Bot. Mag.* t. 8707; April 1917).—A native of Manchuria and Corea. A hardy perennial for the rock garden, flourishes well in moist shady spots. Flowers small, white, numerous.—*L. C. E.*

Sechium edule Sw. By O. Stapf (*Bot. Mag.* t. 8738; Dec. 1917).—Native of tropical America. A monœcious climbing shrub, will grow well in a conservatory but requires a lot of room. Fruit large and fleshy, deeply grooved, sometimes beset with soft spinules.—*L. C. E.*

Seed, Home-Grown *versus* **Imported** (*Quart. Jour. For.* Jan. 1918).—In the building up of a home-grown tree seed industry, one of the principal facts to be faced is that seed collected in the British Islands has not always been found to be superior to, or even as good as, that produced abroad. In the main the explanation of this may be sought in the known tendency, common to all living organisms, to adapt themselves closely to the conditions of their native habitat, and the power of transmitting the degree of adaptability acquired to the following generations. *Prima facie*, therefore, it may be taken that in all cases native seed is likely to prove the best. Trees grow comparatively slowly and are correspondingly slow to re-adapt themselves to the conditions of a new environment. Thus species indigenous to a locality having an extreme continental climate—*i.e.* a long, cold winter, very short spring, and short, but often exceedingly hot, summer—or those trees which normally flourish at high altitudes, have perforce to develop and ripen their seed quickly, and are apt to find, when introduced, that the heat afforded by our insular summers is insufficient properly to ripen their seed, despite the fact that the actual summer season is often longer. The use of seed that is not fully ripe when harvested can only result in disappointment, as will be seen hereafter. On the other hand, seedlings raised in Britain from foreign-grown seed of such species are likely if they are at all frost tender, to suffer badly from spring frosts, because our milder conditions of climate induce earlier root activity, and result in the leaves being flushed in spring before the danger of late frosts has passed. Caution is, therefore, necessary both ways.

Of the pines, larches, spruces, and firs, the cones of Weymouth pine release ripe seed as early as September. Generally, however, the Coniferae do not ripen their seeds till October and November, even, in the case of Scots pine, as late as December, and in the majority of cases the cones only open under the influence of the sun's warmth in the following spring.

Testing and Germination.—To avoid waste of labour and nursery space, and the consequent disappointment, all samples of seed should be tested before sowing as to their percentage of fertility. Small parcels of seed, from 1 oz. to 4 oz. according to the size of the seeds, may be sent to any of the seed-testing institutions, and assessed in accordance with the report received, or tests may be carried out at home. Simple seed tests are based on the fact that the essentials for rapid germination are an even temperature (from 60° Fahr. to 70° Fahr.), sufficient moisture, and free admission of the oxygen of the atmosphere, while exclusion of light is also a contributing factor. If a given number of the seeds to be tested be subjected to treatment fulfilling these conditions, the percentage of fertile seeds can be readily ascertained. A rough and ready test is to cut a few seeds in two, transversely, with a penknife. Their quality is then judged from the appearance of the cotyledons. Another rough but good test for the larger kinds is putting them in water and floating off the light and useless seeds. Good seed should be plump, heavy, of good, bright colour, and have a sweet, healthy smell.

The following table shows the price per pound of the seeds of the principal forest trees. Fluctuations, according to seed years, will naturally occur from time to time.

Broad-leaved Trees.			Conifers.		
Species of Seed.	Per Lb.		Species of Seed.	Per Lb.	
	s.	*d.*		*s.*	*d.*
*Oak (*Q. pedunculata*)	0	1	Scots Pine (Scotch)	9	0
*Oak (*Q. sessiliflora*)	0	1	Scots Pine (Foreign)	5	0
Ash	0	5	Austrian Pine	5	0
*Beech	0	4	Corsican Pine	4	0
Common Alder	0	9	Weymouth Pine	4	6
White Alder	0	9	Larch (European)	2	6
Sweet Chestnut	0	3	,, (Japanese)	6	0
Horse Chestnut	0	1	Norway Spruce	2	6
Sycamore	0	3	Sitka Spruce	17	6
Norway Maple	0	5	Silver Fir	0	9
Birch	0	7	Douglas Fir	15	0
Hornbeam	0	6	*Thuja gigantea*	20	0
Wych Elm	0	3	*Cupressus macrocarpa*	8	0
* Crop failed in 1916.			Nootka Cypress	40	0

A. D. W.

Seed, Old *versus* New (*Queensland Agr. Jour.* Aug. 1917, pp. 59–60).—Whilst new seed of onion and parsnip is advisable, it is found that in melons, cucumbers, and pumpkins, seed two or more years old produces plants that are more fruitful than from one-year-old seed. M. Vilmorin experimented with cucumber seed ten years old which produced plants laden with fruit. R. L. Watts, Professor of Horticulture in Pennsylvania, in his excellent work on "Vegetable Gardening" gives the maximum age of satisfactory germination of well-matured and stored vegetable seeds as follows: Carrot, parsnip, parsley, and onion—1 year; artichoke, asparagus, celery, endive, kale, radish, and salsify—2 years; pea, bean, cabbage, kohl-rabi, leek, pumpkin—3 years; lettuce, turnip, cauliflower, beet, okra—4 years; tomato, cucumber, melon, water melon, and egg plant—5 years; but adds that the above may be taken as a general guide but by no means as a hard-and-fast rule.—*C. H. H.*

Senecio Hectori Buch. By J. Hutchinson (*Bot. Mag.* t. 8705; April 1917).—Native of New Zealand (South Island). A cool greenhouse shrub. Flowers 1¾–2 inches across; Dec.–Feb.; ray florets white, disc florets yellow. *S. Hectori* is readily distinguished from other New Zealand species by its foliage, the petiole of the lower leaves being pinnately lobulate, while the remainder of the leaf is repand-dentate.—*L. C. E.*

Senecio Monroi Hook. f. By J. Hutchinson (*Bot. Mag.* t. 8698; Feb. 1917).—Native of S. Island, New Zealand; a shrub about 6 feet high with narrow leathery leaves, thickened and undulate at the margin, and covered with white wool beneath. Flowers yellow about the size of those of *S. Jacobaea.* Hardy in south-west Cornwall.—*F. J. C.*

Sinofranchetia chinensis Hemsl. By O. Stapf (*Bot. Mag.* t. 8720; July 1917).—Native of China. *Lardizabalaceae.* A hardy climbing shrub, flowers inconspicuous, fruits showy and of bright lavender purple.—*L. C. E.*

Smoke and Fumes, Damage to Vegetation by. By A. Lauder (*Trans. Roy. Scott. Arb. Soc.* xxxii. pp. 181–186, July 1918).—The comprehensive report of the "Selby Smelter Commission" (published by the U.S. Dep. of the Interior, Bureau of Mines, Bull. 98, 1915) is the most important contribution to this subject which has been made in recent years.

The report is well worthy of serious study, not merely on account of the exhaustive nature of the inquiries carried out, and the value of the results obtained, but because of the great advance which has been made by the appointment of this Commission in the method of settling disputes involving scientific evidence and investigation.—*A. D. W.*

Snails and Mealy Bug, Protection from (*Queensland Agr. Jour.* May 1918, p. 186).—*For Snails :* Sprinkle powdered alum round their haunts and also round plants or beds of plants to be protected ; if this is persisted in for a few nights a marked difference will be found. Alum does not appear to hurt vegetation. *For Mealy Bug :* Sprinkle the soil of the pots with naphthalene and just turn it in, say, half a teaspoonful to a 6-inch pot ; a little may also be sprinkled on the crown of the plant. In some cases this is a deterrent more than an exterminator.—*C. H. H.*

Soil Acidity as influenced by Green Manuring. By J. W. White (*Jour. Agr. Res.* vol. xiii. No. 3, April 1918 ; pp. 171–197).—The author finds that in general when fresh green manures are ploughed in, on acid silty loam soil, there is a reduction of the acidity, but this is followed by increased soil acidity ; nitrification can go on quite satisfactorily under suitable moisture, temperature, and aeration conditions ; and that green manured soils are rich in nitrates, in spite of the soil acidity. The actual cause of the increased acidity was due to the added organic matter or the fermentation changes which have occurred in their residues, and not due to the nitrification which had taken place.—*A. B.*

Soil Bacteria, Influence of Carbonates on. By H. L. Fulmer (*Jour. Agr. Res.* xii. Feb. 1918, pp. 463–504).—Experiments were made with a number of soils from Wisconsin to determine the influence of carbonates of magnesium, of calcium, and limestone upon the number of bacteria normally present in these soils. The author finds that the number of bacteria is increased by the application of these carbonates in acid loams and sands. Magnesium carbonates increase the number to a much greater extent than either limestone or calcium carbonate. Nitrification is increased by treatment of these soils with the three carbonates. Magnesium carbonate in soil to which no nitrogenous substance was added favours nitrate accumulation more than does either calcium carbonate or limestone. Bacterial cultures of *B. tumescens* and *B. subtilis* ammonify blood-meal better when sterile soil is treated with any of these carbonates.

Pure cultures of *B. radicicola* also showed increases when placed in sterile soil treated with magnesium or calcium carbonates. In acid or neutral soils treated with magnesium carbonate until soils become alkaline, it was found that *B. azotobacter* is greatly increased in number compared with that of untreated soil. Small quantities of the carbonates were better than larger quantities in producing these effects.—*A. B.*

Soil Extracts. Water Extractions of Soils as Criteria of their Crop-producing Power. By J. S. Budd. **Effect of Season and Crop Growth in Modifying the Soil Extract.** By G. R. Stewart. **The Freezing-Point Method as an Index of Variations in the Soil Solution due to Season and Crop Growth.** By D. R. Hoagland (*Jour. Agr. Res.* xii. pp. 297–395, Feb. 1918).—These three papers give accounts of part of the recent investigations into the actual composition of the solution of earth salts as it exists in the soil around the soil particles. They are too lengthy and full of detail to abstract fully, but it seems probable that, along lines such as are indicated, a method of estimating soil fertility more reliable than present methods of chemical analysis of soils may be developed.
F. J. C.

Soil Fertility, Measurements of. By W. H. Jordan (*U.S.A. Exp. Stn., New York, Bull.* 424, Aug. 1916, pp. 389–412 ; 17 tables).—Describes experiments (during two years in a forcing house) with nine unlike soils from different parts of the State for the purpose of studying the relation of various methods of chemical examination to their crop-producing capacity. The methods were :

(*a*) Complete analysis.

(*b*) Determination of material soluble in hydrochloric acid sp. gr. 1·115 by the A.O.A.C. method.

(*c*) Determination of materials rendered soluble by continued leaching for ten days with (1) water, (2) N/200 HCl, (3) N/25 HCl.

(*d*) Determination of soluble material obtained by shaking five hours with (1) water, (2) N/200 HCl, (3) N/25 HCl.

By none of these methods was there established any relation between the amounts of nitrogen, phosphoric acid and potash, either total or soluble, and crop-producing capacity.

There appeared to be some relation between the total soluble matter in the soil and productiveness, to the extent that two soils giving a very low yield of barley showed greatly less solubility than did the others. This relation, however, was not consistent throughout.

The general result shows that we are not yet in a position to measure the fertility of the soil by any method of chemical examination.—*F. G. A.*

Soil Reaction indicated by the Hydrogen Electrode. By J. K. Plummer (*Jour. Agr. Res.* xii. Jan. 1918, pp. 18–31).—The hydrogen electrode has been used for indicating soil reactions in wide areas of South-East United States, and has shown effects ranging from " true neutrality " to excessive " true acidity " in these soils.

The effects of certain fertilizers on the H ion concentration of long-treated soils have shown (1) that ammonium sulphate has materially increased the H ion concentrations. This acidity has developed often to the subsoil. (2) Sodium nitrate has slightly reduced the acidity of the plots to which it has been applied. (3) Potassium sulphate increases the " acidity " when applied to soils, but not to the same extent as ammonium sulphate. (4) Acid phosphate does not appear to have affected in either direction the H ion concentrations of field plots. (5) Lime materially increases the OH ion concentrations in field plots when added. The acidity developed from ammonium sulphate is more intense in the film than in the free water of the three soils. Monocalcic phosphate does not change in anyway the soil-film water until excessive amounts are added.—*A. B.*

Soil Solutions, Biological Activities and Concentration of. By C. E. Miller *Jour. Agr. Res.* vol. xiii. No. 4; April 1918, pp. 213–223).—The effects of various salts on ammonification are greatly modified by the nature of the soil. For the four salts studied ($MgSO_4$; $CaNO_3$; $CaCl_2$; KCl), each gave a definite point where the ammonification of dried blood in sandy loam was depressed, while only one salt gave such a point with clay loam. The cause of these variations has yet to be investigated, but it is possible that chemical reaction between the salt added and the soil constituents may play some part. The amount of dried blood had an appreciable effect upon the osmotic pressure of the soil solution, the increase depending upon the class of soil. The effects of various salts in soils offer much opportunity for thorough investigation, and will be found to depend largely upon improved methods.—*A. B.*

Spinach Mildew (*Zur Entwickelungsgeschichte des Spinatschimmels* (Peronospora Spinaciæ [*Grev.*] *Laub.*). By J. Eriksson (*Arkiv för Botanik, Stockholm,* xv., No. 15; pp. 1–25; plates).—The author describes and figures the well-known false mildew of the spinach and announces the discovery of "mycoplasm" in the diseased plants similar to that which the same author has described in the case of wheat rust, hollyhock rust, and some other diseases (see *e.g.*, Jour. (R.H.S. xxxiv. p. 469, 1908–9).—*F. J. C.*

Stauropsis Imthurnii Rolfe. (*Bot. Mag.* t. 8714; June 1917.)—A native of the Solomon Islands. A plant for the tropical orchid house. Inflorescence a loose panicle, flowers medium-sized, white with violet-blue markings on the lip.—*L. C. E.*

Strawberry Leaf Beetle, Notes on. By H. C. Efflatoun, F.E.S., M.R.A.C. (*Ann. Appl. Biol.* vol. iv. No. 4, March 1918; pp. 206–210; plates).—Describes the larva, pupa, and imago. The larva and imago damage the leaves in the same way; they eat the lower or upper epidermis and the soft underlying tissue, leaving the opposite epidermis intact. Feeding takes place at night and in early morning. Injury has been reported from Hants, Bucks, and from Russia.—*R. C. S. R.*

Sulphur, Effect of, on Different Crops and Soils. By O. M. Shedd (*Jour. Agr. Res.* xi. pp. 91–104, Oct. 1917).—The result of the application of 100 lb. or 200 lb. sulphur to the acre varied with different crops and soils, but the increase in crop was in no case large, while in some instances there was a reduction. *F. J. C.*

Sunflower Insects, Some (*Jour. Econ. Entom.* vol. x. Dec. 1917, p. 561).—It is reported under this note that Mrs. Cockerell observed bagged sunflower heads to be self-sterile: the ovaries shrink and show no development. In one such head eleven ovaries contained weevil larvæ (*Desmoris*), and in spite of lack of fertilization were larger and swollen, in fact more so than normal seeds. If the observation is correct we are reminded of the experiments of Loeb, in which unfertilized eggs were caused to develop by various stimuli.—*G. W. G.*

Syringa Wilsonii Schneider. By W. J. Bean (*Bot. Mag.* t. 8739; December 1917).—Native of Western China. A handsome Lilac flowering about the beginning of June and easily propagated by cuttings or seeds. Flowers pale lilac, darker at the base of corolla tube.—*L. C. E.*

Tobacco Wildfire. By F. A. Wolf and A. C. Foster (*Jour. Agr. Res.* xii. pp. 449–458 ; Feb. 1918 ; plates).—A disease of tobacco causing death of leaves is described, its origin being the attack of the bacillus *Bacterium tabacum*. A large amount of damage has been reported although the disease seems a comparatively new one.—*F. J. C.*

Tomato, &c., A Disease of, caused by a New Species of Phytophthora. By G. H. Pethybridge and H. A. Lafferty (*Sci. Proc. Roy. Dublin Soc.* xv. pp. 487–505, Feb. 1919 ; plates).—The root system and lower part of stem are caused to rot, leading ultimately to the death of the plant. The authors propose "foot-rot" as the name of the disease. A species of *Phytophthora*, for which the name *P. cryptogea* is proposed, has been isolated and proved to be the cause of the disease. The same type of disease associated with the same fungus has been found in Petunia, and something very similar, if not identical, in Aster and Cheiranthus. The disease is contracted from the soil, and may be prevented by thorough heat-sterilizing of the soil [and pots]. The tops of diseased plants may be rooted and will grow away to fruit healthily.—*F. J. C.*

Tomato-growing. By C. W. Waid (*U.S.A. Exp. Stn., Michigan, Bull.* 89 ; 9 figs.).—The usual cultural directions are given. Caterpillars are destructive. They can be poisoned with a mixture of Paris green, molasses and bran.

Cracking of the fruit is due to sudden changes in the supply of water in the soil. Dry or blossom end rot is due to the same cause. Leaf-spot (*Septoria*), Leaf Mould (*Cladosporium*) and Downy Mildew (*Phytopthora*) can be controlled by spraying with Bordeaux mixture. When tomatos are repeatedly grown on the same soil they are liable to suffer from *Fusarium* Wilt and *Rhizoctonia*. *S. E. W.*

Tomato Seeds, Utilization of. By F. Rabak (*U.S.A. Dep. Agr., Bull.* 632).—The waste material in pulping tomatos is dried and the seeds separated from the skins by a separator. Oil is extracted from the seeds by pressure or by extraction with carbon tetrachloride. The former process yields the purer product, but the latter gives the larger yield. The refined oil is pale yellow and has a nutty taste and smell. It may be used as an edible oil or for making soap. The meal from the extracted seed is mixed with the skins and used for feeding cattle.—*S. E. W.*

Vanda luzonica Loher. By R. A. Rolfe (*Bot. Mag.* t. 8709 ; May 1917).—A native of the Philippine Islands. A plant for the tropical house. Flowers showy, over two inches wide, sepals and petals white, with a tinge of purple towards the apex, lip three-lobed, pouched at the base.—*L. C. E.*

Vegetables, Supposed Deterioration of. By C. F. Kinman and T. B. McClelland (*U.S.A. Exp. Stn., Porto Rico, Bull.* 20).—The generally accepted view that vegetables from temperate zones deteriorate when grown through several generations in the tropics, is proved by prolonged series of experiments to be incorrect. The yield and character of vegetables is greatly influenced by the season of planting. Seed rapidly deteriorates in the tropics, when exposed to the humid atmosphere. This accounts for many of the bad results.

The difficulty may be overcome by preserving the seed in bags, which are placed in air-tight vessels, at the bottom of which calcium chloride is placed. A disc of wire gauze is placed between the calcium chloride and the seed bags. *S. E. W.*

Vegetation and Reproduction with Special Reference to the Tomato. By E. J. Kraus and H. R. Kraybill (*U.S.A. Exp. Stn., Bull.* 149, Jan. 1918 ; figs.).—The authors discuss the causes of flower, and leaf-shoot production, giving the results of experiments and observations, and conclude : Plants grown with abundance of available nitrogen and ample opportunity for assimilation are vigorously vegetative, but unfruitful. Plants grown at first with much, then with a moderate, supply of available nitrogen are less vegetative, but fruitful. Those grown at first with abundance of nitrogen, then with a very low supply, are neither vigorous nor fruitful. The conditions for the initiation of floral primordia, and probably also blooming, are not necessarily those accompanying fruit-setting ; nor is the failure of the latter entirely due to lack of pollination or fertilization. Markedly vegetative plants may shed their flowers entirely, and markedly non-vegetative retain them many days without development. The conditions conducive to fruitfulness are largely due to a proper balance between carbohydrate and nitrogen constituents of the plant ; and pruning promotes or retards fruitfulness by affecting this balance. More exact information is required before an accurate estimate of the causes of unfruitfulness and sterility can be made.—*F. J. C.*

Weed Seeds, Buried. By Winifred E. Brenchley (*Jour. Agr. Sci.* vol. ix. Part 1; 1918).—It is often stated that crops of weeds, especially charlock and poppy, appear when "old pasture" is ploughed up. On inquiry, however, it is usually found that the land in question was under the plough at no very distant date. But there are cases in which this was not so, and it has been established by P. Becquerel, the British Association (experiments of 1840–57), and others that the seeds of some species of plants are capable of germination after being buried in the soil for eighty years. Since 1915 the author has been conducting experiments to test the germinating power of seeds buried at different depths in the soil under natural conditions. Her method consisted in taking borings to a depth of twelve inches from various fields of known history and examining the soil thus obtained in successive layers each one inch thick. The layers were separately transferred to sterilized pans placed in a greenhouse and watered. The seedlings which appeared were identified and counted. The land examined was of three classes, viz. (*a*) old pasture never, so far as was known, under the plough; (*b*) pasture originally arable; (*c*) arable. As might be expected, seedlings were most numerous in the upper three or four layers, but a fair number, altogether, were obtained from the bottom layer twelve inches below the surface, the lowest layer from the arable land giving the greatest number.

In the case of a pasture which had certainly been under grass for 300 years four borings gave four seedlings of arable weeds (one from the seven-inch deep layer), 372 of grassland plants (one from the twelve-inch layer, ten from the ten-inch layer, and eighteen below six inches and not so deep as ten inches), and 29 of grasses. Four borings from pasture land which was arable fifty-eight years ago gave 30 arable weed seedlings, 100 seedlings of grassland plants, and 138 seedlings of grasses. One-third of the first named occurred in the five-inch layer and there was one seedling arable weed in the seven-inch layer. There was none at a greater depth. As many as ten seedlings of Orache (*Atriplex patula*) occurred and came from the third, fourth, and fifth inch layers. Another field under grass since 1885 gave 74 arable weed seedlings which came from all depths from 1 to 12 inches. A third field under grass since 1906 gave no fewer than 457 arable weed seedlings (twenty-six of these from the twelve-inch layer). As compared with this number of 457 there were only 121 seedlings of grasses. As regards arable land two borings having a total volume of half a cubic foot of soil and taken from a field cultivated under an ordinary rotation produced 782 arable weed seedlings, 35 seedlings of plants common to grassland and arable, and 57 seedling grass plants.

The general conclusion is that there is a striking difference between the buried seed flora of true permanent pasture and that of land which was at some time under the plough, even though nearly sixty years have elapsed since the latter was laid down. The permanent pasture land is largely colonized by species of grasses and of miscellaneous plants definitely associated with pasture and never with arable. On land that was originally arable occur a large number of plants common to both arable and grass land such as chickweed, hardhead, and ribwort, and in addition a fair number of true arable weeds also. It is almost certain that these last have survived fifty-eight years, and the strongest argument in favour of this belief is the regular change in proportion of arable land seedlings corresponding to the number of years which have elapsed since the land was grassed down. On the other hand, the case for the appearance of *large* crops of charlock, poppy, or other arable weed on ploughing up old pasture must be regarded as non-proven, since these particular weeds were not obtained from the three hundred year old pasture nor from that laid down nearly sixty years before.—*J. E. W. E. H.*

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JANUARY 15, 1918.

Field-Marshal the Rt. Hon. Lord GRENFELL in the Chair.

Fellows elected (142).—A. H. Appleby, P. H. Arch, Mrs. E. Armitstead, H. Ball, Mrs. P. M. C. Benthall, Miss I. Berkley, W. L. Bevan, C. W. Biddulph, R. Billingham, Miss M. Blake, C. Blakes, Mrs. M. E. Bland, D. H. Bostock, E. D. Bostock, F. M. Bostock, H. J. Bostock, J. S. Botterill, A, G. Bramhall, H. A. Britton, P. Bridgewater, R. Bullen, W. Burden, C. Button, Rev. J. Carter, R. E. Clapham, J. Clark, Mrs. R. Coldwell, M. F. Coode, E. Cooper, A. A. Copland, A. D. Crawford, Mrs. E. Crossley, P. Crossley, Miss J. Davenport, E. G. Davies, Miss M. L. Davies, Col. H. Davies-Evans, Miss P. Day, T. N. Dickie, Sir J. McCrone Douie, Miss D. Duckworth, Mrs. Duff-Gordon, Mrs. J. Durrant, E. J. Elford, T. P. Elkes, Miss K. Findley, H. E. Ford, J. G. French, G. Garnett, D. Gibb, G. F. Grove, W. J. Guise, F. Hansford, Mrs. T. Haslam, Mrs. Hazlehurst, Mrs. E. Henry, Miss S. Hewitt, Mrs. A. Hignett, Miss E. M. Hincks, R. Hughes-Bullar, Mrs. C. Hunt, M. C. Hunter, Dr. D. H. Jackson, R. M. C. James, W. A. Jenkins, G. F. Jones, H. M. Jones, Mrs. Labouchere, R. Lake, A. Lamb, Major T. M. Lane, Miss F. M. Larkin, W. O. Leatherdale, J. W. Lewis, Miss H. Little, J. Lodge, J. L. Lodge, G. T. Lowe, P. G. Mackinnon, L. M. Marshall, G. S. Martyn, G. A. Mather-Jackson, Miss M. G. Matthey, J. H. May, J. W. Miles, L. M. Miles, H. S. Murfitt, W. Negus, G. N. Ogilvie, Mrs. H. O'Hagan, G. G. Panter, A. E. Parkes, Mrs. L. Parkinson, Miss A. Peirce, R. E. Pettifor, A. N. Pitts, H. B. Plant, Mrs. Poole, J. G. Poulter, Miss I. W. Powell, J. Priest, G. Procter, Mrs. G. Renton, Miss C. Rhodes, Mrs. H. Spring-Rice, J. Roberts, F. E. Rogers, Miss I. Rogers, C. R. Rose, Mrs. M. W. Rose, Mrs. L. De Rothschild, Col. G. R. T. Rundle, S. Salter, A. Scratton, Earl of Selborne, J. Shelmerdine, F. E. J. Smith, J. T. Smith, Miss M. Smith, Major H. Spencer, A. Spiby, A. Stratford, C. E. Strickland, Miss Sturdy, Mrs. H. Swanwick, T. W. Telling, W. Thomae, Rev. C. J. Todd, Mrs. J. Trevor, Mrs. L. M. Unwin, H. J. O. Walker, C. Wall, T. Weaving, A. N. West, J. A. Wetherall, Rev. Canon Whittingham, B. J. Williams, H. Wilson, G. S. Woodcock, D. F. Wright, Miss M. Yates,

Affiliated Societies (45).—Army Pay Corps Allotment Association, Bawtry Cottage Garden Allotment Association, Beccles Gardening Association, Birkenhead Corporation Allotment Association, Bournville Gardeners' Association, Bradford Paxton Horticultural Society, Brentford Allotments Association, Briercliffe and District Horticultural Society, Brompton Horticultural Society, Bromsgrove and District Gardeners' Association, Cresswell Garden Holders' Association, Criccieth and District War Allotment Association, Darfield and District Co-operation Protection Society, Douglas Allotments Association, Dulwich Chrysanthemum and Horticultural Society, Edenfield and District Horticultural Society, Forest and Stratford Horticultural and Chrysanthemum Society, Frimley District War Agricultural Society, Halstead War Emergency Vegetable Produce Society, Harborne Allotment Holders' Association, Killay and Dunnant Food Production Society, Knebworth and District Horticultural Mutual Improvement Society, Langley and District Horticultural and Thrift Society, Lepton Amateur Gardeners' Association, London and North-Western Horticultural Society, Margate Allotment Holders' Association, Milnrow W. D. Horticultural Society, Monmouth Street Horticultural Society, Mossley Horticultural and Market Gardeners' Society, Mumbles Allotment Holders' Association, National Land and Home League Society, Prestatyn Allotment Holders' Association, Risca and Crosskeys Horticultural Society, Rotton Park Allotment Holders' Association, South Normanton Seed Club Horticultural Society, Sherborne and District Horticultural Association, Southfields Agricultural War Association, Limited, State Collieries Floral Society, Uttoxeter Allotment Holders' Association, Uxbridge and District Co-operative Society, Victoria Road Institute Gardeners' Section, Walthamstow Town Allotment Association, Widnes Vacant Land Cultivation Society, Wigan and District Allotment Holders' Association, W. and G. Horticultural Association.

GENERAL MEETING.

JANUARY 29, 1918.

Sir HARRY VEITCH, V.M.H., in the Chair.

Fellows elected (71).—A. Acworth, C. S. Anthony, A. S. Ashton, Miss Beattie, G. F. Beck, Miss F. E. Bidwell, Miss J. A. Boulton, B. C. Bradley, F. E. Brightman, E. C. Browne, H. H. Brunton, C. H. Clewley, Mrs. Colson, B. Cook, Rev. W. Cooper, Mrs. F. Coryton, Miss H. R. Cowan, Miss H. M. Cox, J. H. Dale, Miss C. E. D'Arcy, H. E. Deacon, A. C. Downs, F. B. Dunkerley, H. Elliott, R. Fairclough, Mrs. F. Gascoigne, M. Greenwood, G. Grove, E. B. Hall-Hamilton, A. H. Hanworth, W. P. Harding, Col. E. S. Heard, Hon. F. Henley, A. R. Hinks, J. L. Holbrook, A. G. Hulbert, A. H. Hulme, G. C. Kirtley, J. Lambert, Miss C. Long, Mrs. J. Lynch, J. Lyon, H. Masefield, W. H. May, Miss E. Morrison, Mrs. A. North, W. W. Peal, F. W. Platt, E. J. Platt, A. Poupart, Mrs. M. E. Pulman, Rev. G. Purchas, Mrs. A. W. Raikes, Mrs. W. Rawnsley, Miss B. W. Reed, W. J. Rich, S. Spencer, L. Taylor, E. P. Thompson, M. Townsend, Mrs. Turner, R. G. Underhill, P. Venables, M. J. Walford, F. A. Wheeler, J. W. Williams, Lady A. Willoughby, H. Wood, E. D. Woodhouse, P. Woods, E. Wrighton.

Fellows resident abroad (2).—Miss I. Preston, R. S. F. Simson.

Affiliated Societies (17).—Bell House Garden Society, Bingley Urban Food Production Society, Delph Botanical and Field Naturalist Society, Denton Amateur Garden Association, Derbyshire Garden and Allotment Society, Kensal Rise and District Allotment Society, Limpsfield, Oxted, and District Society, Llantarnam, Llanfrechfa Allotment Society, Magdalen Park Cultivation Society, Market Drayton Food Production Society, New Maldon Small Holders' Association, Penzance and District Horticultural Society, Royton Allotment Gardeners' Association, Settle and District Allotment Holders' Association, U.R.E. Horticultural Society, Vicarage and Priory Road Sites Allotment Society, Wargrave, Hare Hatch, Knowl Hill, &c. Allotment Association.

ANNUAL GENERAL MEETING.

FEBRUARY 12, 1918.

Field-Marshal the Rt. Hon. Lord GRENFELL in the Chair.

Fellows elected (74).—Mrs. J. C. Anderson, T. M. E. Armstrong, Miss K. N. Baird, E. H. Barlow, F. J. Barrow, E. S. Birkenhead, G. Bradley, W. T. Brodie, Mrs. A. F. Burder, S. H. Buxton, J. P. Campbell, Major H. R. Cayzer, Mrs. C. Chichester, Miss A. Clegg, C. H. Collett, T. Collister, W. G. Crafer, W. B. Dennis, Miss G. Evans, Miss A. H. Flood, Mrs. F. A. Frost, E. N. Galloway, J. J. Gazdar, Lieut. W. Giffard, H. J. Gilby, F. Gower, Mrs. H. Harriot, G. W. Harrison, H. Hewitt, Brig.-Gen. C. Hill, E. Hincks, H. Hodgson, H. N. Howard, Miss Inglis, J. B. Jones, R. M. A. Keeble, Mrs. G. F. London, M. P. Lyle, G. S. Macquoid, Miss E. R. Martin, Miss Meakin, Mrs. Mercer, Miss Mongredien, Mrs. M. R. Mordan, E. N. Mullett, Major C. D. Murton, Mrs. F. Nicholson, W. B. Ogilvie, C. Osenton, Miss E. M. Parkinson, J. R. Paull, J. Pearce, J. Pearson, C. Plaistowe, J. H. Salmon, Lady Savory, Mrs. E. M. Shaw, H. M. Simons, W. H. Stead, Miss E. Story, G. Stringer, H. V. Taylor, J. S. Thomas, A. J. Thompson, P. J. Thompson, Mrs. T. H. Torbock, P. D. Tucker, Mrs. A. Tuckett, R. Wadham, Mrs. M. Webster, R. C. West, Mrs. T. R. Wilson, G. Winter, J. Wylde.

Associate (1).—J. T. Harris.

Affiliated Societies (13).—Acton Allotment Holders' Association, Appley Bridge and District Allotment Society, Ashtead Food Production Society, Bottesford and District Horticultural Society, Brentwood Allotment Holders' Amateur Society, Drayton Horticultural Society, Haslingden and District Gardeners' Association, Hillfields and District Gardeners' Association, Launceston United Cottage Garden Society, Orston, Elton and Thorston Garden Holders' Association, Regimental Institute 1st C.B. Highland Infantry, Swadlincote Food Production Society, Tipton Allotment Holders' Federation.

President's Speech.

My Lords, Ladies, and Gentlemen,—The Annual Report is so very full and explicit that there is not much left me to say. But there are one or two points which I wish to accentuate.

First I should like to say how grateful I and all my colleagues on the Council are for the unvarying support which the Fellows continue to give us—a result which the Council desired to secure. When war broke out it was foreseen that a certain number of Fellows would fall away ; but this falling away has been so successfully counteracted by the acquisition of new Fellows that the actual number of our members at the end of last year is only eighty less than it was this time last year. This does not include Fellows now on Active Service, many of whose annual subscriptions are allowed to be in suspension, so that the loss by the War upon the *income* of the Society is more marked than on its numbers. The subscriptions for 1917 only amounted to £17,000 compared with nearly £20,000 in 1913, a decrease of nearly £3,000, which, of course, adds to our difficulties and anxieties.

Whilst the loyalty of the Fellows is appreciated, subscriptions cannot be withdrawn without effect on the whole work of the Society.

Our Society's Food Production activities have been very far-reaching in their effects—in fact, it is impossible to overestimate them. It should never be forgotten that it was *our Society* which, on August 4, 1914, inaugurated the Nation's great fruit and vegetable campaign, and the Government had not even thought of the matter ; and I can say for myself and my colleagues that we then had little idea of the extent to which this campaign would grow. We instinctively saw enough of the difficulties before us to make us endeavour to rouse the whole Nation to prepare for them.

We must not forget that our Society sent deputations to the Government departments, urging the increase of allotments and the development of vacant ground for vegetable cultivation. The work of all this, which devolved upon the Council and its officers, can never be fully told.

Owing no doubt to the strain and stress on the Postal Department, as on all other departments, we have, during the last couple of years, found not a few letters miscarry, but no letter of inquiry for information, direction, or advice, which has been received, has remained without response ; and I think it will surprise you to know that during a large portion of the year an *average* of 1,000 *letters a day* have been delivered at our office.

However, the gravity of the food situation led us to set up a special Food Production Committee, which did much initial good work, and assisted us in arriving at the prime necessities of the situation and in discovering the best means from our point of view of meeting them effectively.

Another result of this first Food Production Committee was the most generous gift of £150 from Mr. J. S. Arkwright of Herefordshire, for the further practical promotion of the work.

This liberal assistance enabled us at once to set up another important branch of work, and one of enormous influence, namely, our Panel of Expert Garden Advisers, Lecturers, and Demonstrators, upon which 2,000 names are now inscribed. This army of voluntary workers has stimulated and assisted a greatly increased Food Production. The members of the Panel have assisted in various ways, such as by serving on local Food Production Committees, giving demonstrations on allotments, giving advice to allotment holders, and instructing school children. From the reports and letters we have received, we are able to form an estimate of the valuable work which they have accomplished. And we hope that Fellows will encourage, recognize, and co-operate with these hard-working volunteer members of our Panel.

It is impossible to get complete statistics on their work ; but from the reports on their spring and summer work received in September, we calculate that no fewer than 2,600 lectures, and 335,000 demonstrations and advisory visits have been made. The winter work done will not be known until the half-yearly report is received for the six months ending in March. But as a sample of what the 2,000 are doing, I may mention that one of them has given no fewer than 228 lectures and demonstrations in the last *six months.*

In addition to the work done by the members of our Panel, we made an effort to respond to the demand for special lecturers prepared and sent forth directly from the Society.

Accordingly, a number of experts were invited to a fortnight's conference at the Society's Gardens, when the special details of the work were explained and considered, and the teaching to be given in the lectures was standardized so that all might be teaching the same thing and that there might be no divergence in the instruction given as between one and another.

The Conference succeeded beyond our best expectations, and, by the end of March, these lecturers will have accomplished a vast volume of work. The letters we have received from those to whom they have lectured have generally been most appreciative and encouraging.

Yet a third way of instructing the country was introduced, and has been widely effective. Fifteen circulating lectures were prepared and printed, and something like 3,000 lantern slides made to illustrate them.

These have met a demand not otherwise provided for.

Of these 15 lectures, in most cases 6, and in some cases as many as 12, *duplicate* sets of slides were prepared, so that the number of lectures actually available amounts to 112 ; and, for the most part, they have all been in constant circulation.

And yet a demand for lectures of a still higher order was evident, and has been met in two ways : First, the Council invited Mr. Cuthbertson to give public lectures in London on Potato Growing. The lectures were felt to be of such importance that the Lord Mayor has been so good as to offer that the first should take place at the Mansion House, and it will be delivered to-morrow at 3 o'clock. Special tickets will be necessary, but you can get them here in the office.

Such a lecture, delivered under such prominent auspices, will probably attract a large audience, and it will be made widely known by the Press. The lecture itself will be distributed in print immediately after its delivery, and will in future be obtainable as one of the Society's War Pamphlets by all who may like to apply for it at the usual price of 4*d.* A second lecture by Mr. Cuthbertson will concern autumn work in potato-growing, and will be given at the Caxton Hall, Westminster, on June 19.

Secondly, Mr. Chittenden, the head of our School of Horticulture and of our Technical Education Branch, is lecturing all over the country in connexion with University Extension Courses and at well-known University and manufacturing centres, where his lectures are being well received and are proving highly influential in directing food production along right lines, and encouraging others to take up the task of providing their own home-grown food.

The Society has always been an influential body, but I doubt whether it has ever exercised the same extent of national influence as it is doing to-day.

The gifts of bulbs and seeds to Base Hospitals and Camps have been most gratefully received and acknowledged, and the thanks of the Society are particularly due to those who so kindly provided the gifts. I might specially mention the bulbs and seeds sent to the British Prisoners' Camp at Ruhleben, and to the Camps and Hospitals near Boulogne which I personally inspected last summer.

A regular organized Horticultural Society has been established at Ruhleben, and has become a great solace to those who have associated themselves with it under such trying conditions.

It was with very great pleasure that we received a visit last month from the President of the Ruhleben Horticultural Society, who was one of the first Prisoners of War to be allowed home from thence. On the very first day after his landing in England he called at the offices of the Society to convey the greetings of the Ruhleben Society, and to express their appreciation of the sympathy and help accorded to them by our Society during their captivity.

Photographs of the Camp are here on the table if any of you would like to see them after the Meeting. To hear of glasshouses built for the most part of packing cases, and of flower shows (figs. 34, 35) being held under such conditions, speaks volumes for the indomitable British spirit and pluck.

That our efforts have been very effectual in assisting the numerous Camps of Prisoners of War and Base Hospitals may be judged by an incident which occurred a fortnight ago in the neighbouring church of St. Stephen's. Bishop Berry, in the course of a sermon there, spoke of his visit to Ruhleben and laid special emphasis on the really beautiful gardens the prisoners had established, and he asked : " And to whom is all this primarily due ? Why " (he said in emphatic tones) " Why, to the Royal Horticultural Society."

The report mentions the valuable scientific and practical work still going on at Wisley, despite the many difficulties under which the staff is labouring.

We look forward to the end of the War, when our full staff may be restored and enable us to go forward with the programme of work outlined in the Garden Development Scheme, a programme which will then become increasingly necessary and, I hope, increasingly effective.

The Laboratory is now finished and paid for, and a handsome and useful building it is. And as there is every evidence that in the life of the future the work of the scientist is likely to find a more prominent place side by side with practice, there is every hope for great results—results of which the Society will be justly proud. That we are thus prepared for a better future, and with the lessons which the War has taught us, of the *value of applied scientific knowledge in every branch of industry*, we feel glad that the work of building the Laboratory was begun when it was, and that it is now ready for most efficient work in the future.

Notwithstanding the great increase of work of which I have been speaking and thanks to the loyalty, spirit, and energy of the exhibitors, we manage to keep our Fortnightly Meetings well up to the mark, although still debarred from the use of our own noble Hall.

In the name of the Council and of the Society I wish to thank all those who help us thus to maintain the quality of our Meetings—Meetings which now have been held for more than one hundred years by our fathers and grandfathers, and which we hope to hand down unimpaired for many generations to come.

The thanks of all present and of all future horticulturists are due to Sir Albert Rollit for securing the institution by the University of London of a Degree in Horticulture. It is a work which will go down to future generations in its process of elevating the horticultural profession and giving rank to the horticultural scientist, just as our Society's National Diploma gives rank to the practical gardener.

By a most happy co-ordination, our Diploma and the University Degree are connected, so that those gaining the Degree will meet personally, during the progress of the examinations, candidates for the Diploma. Thus, those engaged in the practical and scientific sides of horticulture will, in their early student days, be brought into contact with one another, which should lead to a mutual understanding of and interest in each other's work.

Considering the difficulties connected with the War, I think that all that could be done has been done to maintain the ancient prestige of this great Society.

Before formally moving the adoption of the Report I should like to tell you that the Council has already approached Captain Bathurst and Lord Rhondda on the subject of sugar for jam from home-grown fruits—a matter which so closely affects almost every one of our Fellows; and the Secretary tells me that he has received notice of a Resolution to be submitted to this Meeting to-day upon the subject.

I now beg to move the adoption of the Report.

This was seconded by Sir Harry Veitch, who explained the satisfactory position of the Society's Finances.

The Report was then carried, and the following names of President, Vice-Presidents, and Members of the Council and Officers having been duly proposed and seconded, and the list sent round in accordance with Bye-law 74, and no alternative names having been proposed, they were declared by the Chairman to be elected:

	Proposed by	*Seconded by*
As President.		
Field-Marshal the Right Hon. Lord Grenfell, G.C.B., G.C.M.G.	Sir Harry J. Veitch, V.M.H.	Sir David Prain, C.I.E., F.R.S., V.M.H.
As Treasurer.		
Sir Harry J. Veitch, V.M.H.	Mr. F. J. Hanbury, F.L.S.	Sir Albert K. Rollit, D.C.L., LL.D., V.M.H.
As Secretary.		
The Rev. W. Wilks, M.A., V.M.H.	The Rt. Hon. Lord Lambourne, C.V.O.	Sir Harry J. Veitch, V.M.H.
As Members of Council.		
Mr. F. J. Hanbury, F.L.S.	Mr. E. A. Bowles, M.A., V.M.H.	Mr. J. Hudson, V.M.H.
Capt. and Hon. Major C. G. A. Nix.	Mr. A. W. Sutton, V.M.H.	Mr. W. A. Bilney, J.P.
r. A. W. Sutton, V.M.H.	Mr. F. J. Hanbury, F.L.S.	Sir Albert K. Rollit, D.C.L., LL.D., V.M.H.

As Vice-Presidents.		
The Duke of Bedford, K.G., F.R.S. The Rt. Hon. The Earl of Ducie, F.R.S. Sir John T. Dillwyn-Llewelyn, Bart., D.L., J.P., V.M.H. The Duke of Portland, K.G., P.C., G.C.V.O. The Rt. Hon. James W. Lowther, P.C. Sir Daniel Morris, K.C.M.G., V.M.H.	The Rt. Hon. Lord Lambourne, C.V.O.	Mr. Henry B. May, V.M.H.
As Auditor.		
Mr. Alfred C. Harper.	Sir Harry J. Veitch, V.M.H.	Mr. Henry B. May, V.M.H.

V.M.H. Medals were presented to the following, viz. Mr. W. Jackson Bean, Mr. F. J. Chittenden, F.L.S., Sir Herbert Maxwell, Bart., F.R.S., D.C.L., LL.D., Dr. A. B. Rendle, F.R.S., F.L.S., and Sir Albert K. Rollit, D.C.L., LL.D., Litt.D.

Sir Herbert Maxwell, Bart., F.R.S., D.C.L., LL.D., was unfortunately unable to be present.

Mr. C. E. Shea spoke on the proposal of the Food Controller to withhold sugar from private fruit-growers for jam-making, and he proposed, and it was seconded by the Rev. G. H. Engleheart and carried unanimously, that the Fellows of the Royal Horticultural Society in Annual Meeting assembled record an emphatic protest against the decision of the Food Controller that, notwithstanding that there is an officially admitted greater quantity of sugar now in this country than was available last year, no sugar is this year to be allowed for home-made jam and preserves to the private growers of fruit, entailing the loss of an immense amount of valuable National Food. And this Meeting further records its entire approval of the Memorandum of Protest addressed by the President and Council of the Society to the Director of Sugar Distribution on January 31 last.

Mr. Oke, who supported the Resolution, further proposed that a Deputation should wait upon the Director of Sugar Supplies and deliver the Resolution. This was agreed to and the following were accordingly appointed, viz. Lord Lambourne, Sir Albert Rollit, Messrs. W. A. Bilney, J. Cheal, James Hudson, C. E. Shea, A. W. Oke, W. H. Page, Owen Thomas, and the Rev. W. Wilks, with power to add to their number.

Sir Albert Rollit proposed a special vote of thanks to the Secretary, and congratulated him on his completing on that day his thirty years' secretaryship of the Society and his fifty years of Fellowship. He also proposed a vote of thanks to the staff for the work they had done during the year.

These proposals were carried with acclamation, and the Secretary briefly acknowledged them.

The Meeting closed with a vote of thanks to the Chairman.

REPORT OF THE COUNCIL FOR THE YEAR 1917.

1. **The Year 1917.**—At a time when almost every individual—and certainly every Society and Organization in the Kingdom—has sorely felt the pressure of War conditions, it would ill become the Council of a Society which has been able to be of such great practical use to the nation, to complain. At the same time it is no more than their duty to point out, that it is only by the loyal support of the Fellows that they have been able to accomplish so much, and to act as an Assistant in Horticulture to the Government ; and it depends entirely on the continued support of the Fellows whether the Society will be able to maintain its help and advice or compelled to forgo it in future. To say that the Society cannot live without Fellows' subscriptions is a truism—but it is also a fact on which everything turns, and which possibly many forget. It would be sad indeed if, after 114 years of marvellously successful work for the horticulture of this country and its colonies, culminating in its recent most useful development during this War—it would be sad indeed if the Society were permitted to suffer loss.

2. **Increase of Garden Produce.**—Since the War broke out the Society has been of incalculable benefit to the nation. It will be remembered that it was so quick to see the necessity for home-grown food that, on the very day after the declaration of War, a letter was sent to the Press urging this very matter. This letter inaugurated the Society's Food Campaign, which it has since pursued unremittingly.

It is, therefore, not a matter of surprise that, in the beginning of the year, the Government sought the Society's co-operation in still further organizing the country and stirring it up to make an adequate effort to produce all the fruit and vegetables required for home consumption ; and, further, that the Director-General of Food Production should have asked the Council to release Dr. Keeble, the Director of the Society's Gardens at Wisley, to take the head of the Horticultural Section of his Department, under a joint arrangement between that Department and the Society. The Society was thus linked up with, and officially recognized by the Government of the country, since when, by this happy co-ordination of effort, the Society and the Food Production Department have been able to accomplish a vast amount of work in the direction of Food-producing and Food-conserving.

The work of the year 1917 in its earlier stages was organized by the Society's Food Production Committee. In this connexion the President and Council desire to thank Mr. Nugent Harris, Mr. R. Phillips, Mr. Mattheson, and Mr. Edward White for the helpful services they rendered. This Committee undoubtedly set in motion new and very useful forces in connexion with horticultural organization, the final issue of which is as yet far from being fully realized, but will certainly have an important bearing on the horticulture of the future.

3. **R.H.S. Panel.**—At the beginning of the year the Council set up a Panel of Expert Garden-Advisers, and nearly two thousand names from all parts of the Kingdom are now inscribed upon it : capable men, who at a moment's notice are prepared to give voluntary help and assistance to allotment holders, cottage gardeners, and amateurs, by lectures, demonstrations, and advice, wherever the Council may send them. From the periodical reports received, it is abundantly evident that the members of the Panel have done a vast amount of good work, and have earned the gratitude, not only of the Society but of the country at large. The work of this Panel is being still further organized and applied, as rapidly as the staff and circumstances permit.

A set of fifteen circulating lectures, with admirable lantern slide illustrations, have been prepared and printed for the use of the Panel and are in great demand. These lectures cannot be too strongly recommended to new societies and organizations. No charge is made for their hire, the only cost to the borrower being the postage on their return, and the making good of any slides broken.

4. **Connexion with the Government.**—In the summer a promise of a Grant of money was received from the Treasury to assist in defraying the

expenditure the Society was incurring on Government Food Production work. This enabled the Council to enlarge its efforts, and a Conference was held at Wisley towards the end of September. The Society's Special Representatives appointed by the Council to deliver lectures throughout the country during the winter 1917–18 were present at this Conference. Under the direction of Mr. F. J. Chittenden, F.L.S., V.M.H., assisted by Mr. A. S. Galt of Leeds University and Mr. C. Wakely of Chelmsford Technical Institute, a most profitable fortnight was spent, during which the best methods of fruit and vegetable growing were discussed, with a view of bringing about increased cultivation, and the uniformity of the instruction to be given by all the Lecturers. These Lecturers are now in great demand in nearly all the counties of England and Wales.

The special thanks of the Society are due both to these Representative Lecturers and also to the Members of the Panel—both of whom are doing such excellent and patriotic work in increasing the Food Production of the country.

5. **Food Production Publications.**—The Society's Food-Production Pamphlets and Leaflets have been of great help to the nation during the year. The issue of 200,000 copies of the Pamphlets, 50,000 leaflets on "Fruit Bottling for Cottagers," 50,000 leaflets on "Seed Saving and Autumn Sowing," and 25,000 copies of the Gardener's Diary are figures which speak for themselves. Since the War broke out approximately 500,000 pamphlets, diaries, and leaflets concerning food growing and preserving have been issued by the Society.

Amongst the most generally useful publications of the year which the Society has issued, is a little book by Mr. and Mrs. Vincent Banks on "Fruit and Vegetable Bottling and Preserving," which has had an enormous sale, and the thanks of the Council are due to Mr. Banks for placing the manuscript in their hands for reproduction. Acknowledgment is also due to them for the long series of excellent lectures and demonstrations on fruit bottling given at the Society's fortnightly Meetings throughout the greater part of the past year.

6. **Provision of Seeds for 1918.**—One of the best pieces of work done by the Society's officers has been the research made by Mr. F. J. Chittenden, F.L.S., V.M.H., of Wisley, together with Mr. W. Bean, V.M.H., of Kew, on the subject of vegetable-seed provision for sowing in 1918. As a part of the result of the report they submitted to the Food Production Department, the Board of Agriculture issued a useful leaflet (Food Production Leaflet No. 8), on the subject of "Economy in the Use of Vegetable Seeds." This leaflet may be obtained on application to the Board of Agriculture.

The Society also placed its Laboratory at Wisley at the disposal of the Food Production Department for research work on the subject of potato diseases, under the supervision of Dr. Horne of the Wisley Staff, who is at present attached to the Food Production Department for War Service.

7. **Representations made to the Government.**—Throughout the year the Council have been keenly alive to the interests of horticulture in every direction, and representations have been made to Government Departments on the following matters :—(*a*) potato prices ; (*b*) the provision of sugar for fruit preserving ; (*c*) the release of tin plate for the making of fruit-preserving cans and canning apparatus ; (*d*) the provision of further allotment land and security of its tenure ; (*e*) the preservation of valuable garden stock ; (*f*) the exemption of necessary expert fruit-growers from Military Service ; (*g*) the offer of help in extending the cultivation of school gardens ; (*h*) the importation of bulbs ; (*i*) the carriage of plants ; and (*j*) the need for speedy return of empties.

8. **Dutch Brown Beans.**—Probably the most lasting piece of War Work the Society has done is its introduction of the Dutch Brown Bean to British gardens. Mrs. Labouchere most kindly sent the Society samples of this Bean in 1915, and they were grown in a few private gardens, and also at Wisley in 1916. The trials proved so satisfactory, and the quality as a food bean so superior to anything of the kind which we had previously grown, that the consent of the Government was secured for a ton of the beans to be imported last spring. They were widely distributed amongst the Fellows, and a certain quantity was sown at Wisley, from the produce of which a large stock has been secured. These will be distributed to the Fellows in March next, by the same organization, and in exactly the same way as the surplus plants and seeds are always distributed, an eighth of a pint of the bean being regarded as equivalent to each plant, so

that a Fellow with a right to 10 plants, can, if he please, apply for 8 plants and ¼ pint of beans, or, 6 plants and ½ pint of beans, a ½ pint being the maximum. A leaflet with planting instructions, and a comparative analysis of beef, potato, and this bean, will be sent with the seed.

9. **Lectures, &c.**—The Society hopes to continue its food campaign unremittingly throughout 1918, and would be glad to increase it, if funds and staff permit. In this connexion, almost all the Lectures arranged for 1918 are more or less directly connected with Food Production. Special attention may be drawn to a series of Lectures to be given by Mr. F. J. Chittenden, F.L.S., V.M.H., and to two highly important ones on Potato Growing which are being organized. By the kind consent of the Lord Mayor the first Potato lecture will be given in London at the Mansion House, at 3 P.M., on February 13, when the Lord Mayor will occupy the chair. The second will be held in Westminster, at the Caxton Hall, at 3 P.M., on Wednesday, June 19, at which the Rt. Hon. R. E. Prothero, President of the Board of Agriculture, has been asked to take the chair. Mr. W. Cuthbertson, V.M.H., J.P., will be the lecturer on both these occasions. His subjects will be :

February 13.—" Potato Growing : Spring Work in Seed and Planting."
June 19.—" Potato Growing : Autumn Work in Lifting and Storing."

On account of the necessity of knowing how many will be present, the ordinary Fellows' tickets will not admit to these two lectures ; special tickets can be obtained by applying to the Secretary of the Society, Vincent Square, Westminster.

In order to give these two important Lectures a still wider influence in the country, each of them will be in print with illustrations on the day of its delivery and may be purchased for distribution—Single copy, 4*d.* ; or, 14*s.* for 50 ; or 26*s.* a 100. Post free.

10. **Gifts to War Hospitals, Camps, &c.**—The Society has sent out very large consignments of bulbs, seeds, and books, during the year, to the Base Hospitals and Camps in France, and to the Prisoners of War Camp at Ruhleben. The thanks of the Society are particularly due to all who assisted by sending gifts for this purpose. The Society also provided the Flower Stall at the Albert Hall Bazaar for St. Dunstan's Hostel in May, over which the Countess of Limerick kindly presided, many of the Fellows sending very large and valuable contributions.

11. **Wisley Gardens.**—The work at the Society's Gardens has gone on uninterruptedly, though, of course, it has suffered very great inconvenience by the removal of almost the whole of the regular staff. In face of this fact the existing staff is greatly to be congratulated on the work accomplished. Some most useful trials have been conducted, particularly of Wart-resistant varieties of potatos. Reports on these trials will shortly be issued. A valuable exhibit of wart-resistant potatos, with cooked specimens, with the same variety uncooked, was shown at the Society's Fortnightly Meeting on October 23, when it attracted much attention.

Experiments on the pruning and pollination of fruit trees are being continued, and numerous new crosses of vines, strawberries, and *Rubus* are being grown.

Mr. J. K. Ramsbottom's investigation of the Narcissus disease has shown it to be due to the eelworm *Tylenchus devastatrix*, and experiments on soil treatment &c. for this pest, which attacks a great number of food as well as of ornamental plants, are in progress. A Report on part of this work will be found in the *Journal* of the Society, vol. xliii. pt. 1.

In spite of difficulties of travel, &c., many Fellows have visited the Gardens during the past year, mainly in search of advice on food production. The exhibit of apples grown at Wisley arranged in the Laboratory has attracted considerable attention.

The Society has made an offer to the Serbian Government to give free training in Gardening to six young Serbians at Wisley, if the cost of their maintenance can be otherwise provided.

12. **University Degree in Horticulture.**—The Council wish heartily to thank Sir Albert K. Rollit, Chairman of the Horticultural Education Committee of the Senate of the University of London, for the great interest he has

shown in securing the institution by the University of a Degree in Horticulture. The Syllabus of Courses of Studies and Examinations will be found in the University Calendar for 1917.

13. **Frost Report.**—The unusually severe and prolonged winter of 1916–17, and its effect upon plant life in the British Isles is being made the subject of an investigation, which Mr. E. A. Bowles, M.A., V.M.H., a member of the Council, has most kindly undertaken.

14. **Organization of Work.**—During recent years the work of the Society has so greatly increased that the Council at last found it impossible to give to all the matters brought before it, at its meetings, the detailed care they felt they should receive. In the spring of the year a General Purposes Committee was set up to deal with matters referred to it by the Council, and with Finance. Amongst other branches of the Society's work it has also had in hand the oversight of the Society's publications. The Committee has had under its careful consideration matters affecting the *Journal*, amongst them the question of economizing paper and a reduction in the cost of postage. As a result, smaller type will be used for certain parts of it. In this way it is hoped to effect a considerable saving and so help to offset part of the increased cost of publication due to the rise in the price of paper and printing. It will also effect an economy in the amount of paper used. The Publication Department of the Society being an increasingly important one, a separate Publications' Committee was established later.

The Council are glad to discover, in response to their recent post-card asking Fellows who did not wish to receive the *Journal* to notify them of the fact, that the great majority of the Fellows still desire to receive it, thus confirming the Council's previous opinion that the *Journal* is accounted a really useful publication.

15. **Revision of Pritzel's Index.**—The revision of Pritzel's Index has not escaped attention, and, as a first step, two Committees have been set up with a view of finding (*a*) the amount of information which those for whose benefit the revision will be mainly undertaken would wish the new Pritzel to include; and (*b*) the amount of information which those familiar with the preparation of works of this class consider that it may be possible to incorporate. By the aid of these Committees it is hoped to get matters in hand so as to be able to republish the work as soon after the War as possible.

16. **War Relief Fund.**—The work of the Society's War Relief Fund has made considerable progress during the year, but it has undergone a certain transition. As already stated above, the work falling on the Council and on the Office Staff had become more than they could accomplish. Accordingly an outlet was sought for distributing the work attendant upon the Fund by forming a new Committee and setting up a separate department for giving undivided attention to it. This was effected by appointing four Members of the Council to act jointly with four Members of the Ladies' Committee. The offices of the Fund are at present at No. 17 Victoria Street, Westminster.

This Joint Administrative Committee has approached a similar Committee of the Royal Agricultural Society and they have agreed on a reciprocal arrangement for sending out fruit trees, seeds, &c., whereby overlapping may be avoided and a considerable saving in organization effected.

17. **Obituary.**—It is with deep regret that the Council have to record the death of many Fellows, particularly the following:—George Abbey, Elijah Ashworth, Lord Auckland, L. H. de B. Crawshay, C. T. Druery, V.M.H., Lieut. H. L. Foster, Alfred Hemsley, W. Marshall, V.M.H., Geo. Massee, V.M.H., Earl of Mount Edgcumbe, O. G. Orpen, Marchioness of Ripon, Chas. Ross, V.M.H., Leopold de Rothschild, Geo. Schneider, E. D. Till, William Thompson, Ph. de Vilmorin, and Walter Ware.

18. **New V.M.H.**—Owing to the death of five holders of the Victoria Medal of Honour, the Council have appointed the following gentlemen to this distinction, viz.:—Mr. W. Jackson Bean, Mr. F. J. Chittenden, F.L.S., Sir Herbert Maxwell, Bart., F.R.S., D.C.L., LL.D., Dr. A. B. Rendle, F.R.S., F.L.S., and Sir Albert K. Rollit, D.C.L., LL.D., Litt.D.

19. **Numerical Position.**—The following table shows the Society's position with regard to numerical strength during the past year :—

LOSS BY DEATH IN 1917.

		£	s.	d.
Life Fellows	8	0	0	0
4 Guineas	4	16	16	0
2 ,,	87	182	14	0
1 ,,	115	120	15	0
	214	£320	5	0

LOSS BY RESIGNATION, &c.

		£	s.	d.
4 Guineas	1	4	4	0
2 ,,	235	493	10	0
1 ,,	191	200	11	0
Associates	10	5	5	0
Affiliated Societies	1	1	1	0
	438	£704	11	0
TOTAL LOSS	652	£1,024	16	0

FELLOWS ELECTED IN 1917.

		£	s.	d.
4 Guineas	9	37	16	0
2 ,,	146	306	12	0
1 ,,	329	345	9	0
Associates	20	10	10	0
Affiliated Societies	65	75	12	0
Commutations = £47 5*s.* 0*d.*	3			
	572	£775	19	0
Loss.		1,024	16	0
NET DECREASE IN INCOME		£248	17	0

Deaths and Resignations	652
New Fellows	572
NUMERICAL LOSS	80
Total on December 31, 1916	13,911
Total on December 31, 1917	13,259

20. **Committees, &c.**—The Society owes a constantly recurring debt to the Members of the Standing and Special Committees, Chairmen, Judges, Writers of Papers for the *Journal*, Compilers of Extracts, Reviewers, Lecturers, and the several Examiners, who, during the past twelve months have done so much to contribute to the Society's national usefulness and to help to maintain its high standing among the practical and scientific institutions of the world.

The Council desire to cordially acknowledge their obligations to their staff and also to the Press for their invaluable assistance in reporting, and calling attention to, the work of the Society.

By Order of the Council,
W. WILKS,
Secretary.

ROYAL HORTICULTURAL SOCIETY,
VINCENT SQUARE, WESTMINSTER, S.W.
January 1, 1918

	£ s. d.	£ s. d.
To ESTABLISHMENT EXPENSES—		
Ground Rent	690 0 0	
Rates and Taxes	615 11 10	
Electric Light	16 14 6	
Gas	21 1 6	
		1,343 7 10
Salaries and Wages	2,059 2 4	
Printing and Stationery	2,161 8 8	
Postages	543 7 9	
Fuel	21 1 0	
Professional Fees	130 12 0	
Gratuities	65 0 0	
Repairs and Renewals (including £150 for Hall Painting)	225 2 8	
Miscellaneous Expenses	134 19 1	
		5,340 13 6
,, INSURANCES		147 18 7
,, JOURNAL, PRINTING AND POSTAGE		1,616 18 10
,, STAFF PENSION	352 9 8	
Less contributed by the Staff, as per scheme	106 9 4	
		246 0 4
,, SHOWS and MEETINGS—		
Autumn Fruit and Vegetable Shows	325 4 6	
Labour, Floral Meetings and Conferences	402 13 1	
Expenses, do. do.	94 2 3	
Council, Committee and Deputation Expenses	183 17 2	
Painting Orchid Certificates	15 5 3	
		1,021 2 3
,, INSPECTION OF GARDENS		41 0 2
,, PRIZES and MEDALS—		
Awarded at Society's Shows		96 6 4
,, EXAMINATIONS in HORTICULTURE—		
Amount expended	216 15 8	
Less received in Fees	202 11 6	
		14 4 2
,, CONTRIBUTION to LINDLEY LIBRARY—		
Purchase of Books	33 1 3	
Expenses	55 0 0	
		88 1 3
,, SPECIAL EXPENDITURE—		
Contribution to Forrest Account	250 0 0	
Fruit Book	116 0 0	
Tulip Report	83 10 0	
Scientific Studies	10 0 0	
Post Cards (Notice to Fellows re *Journal*)	63 9 1	
		522 19 1
,, DEPRECIATION—		
Hall Glass Roof, Furniture, and Appliances for Shows		260 19 3
,, FOOD PRODUCTION		196 8 1
		10,935 19 8
,, BALANCE, carried to BALANCE SHEET		11,678 1 1
		£22,614 0 0

	£ s. d.	£ s. d.
By Annual Subscriptions		17,067 0 0
,, Entrance Fees		112 7 0
,, Dividends and Interest	1,875 7 0	
,, do. do. Davis Trust	50 7 0	
		1,925 14 0
,, Takings at Hall Shows		42 19 0
,, Journals and Other Publications—		
Advertisements	286 11 0	
Sale of Publications	2,394 7 3	
		2,680 18 3
,, Hall Lettings	88 14 0	
Less Labour Expenses	14 1 0	
		74 13 0
,, Prizes and Medals		37 16 6
,, Life Compositions— Being amount paid by Fellows now deceased		110 5 0
,, Rent of Cottages, Wisley		62 8 0
,, Profit on Conversion of Exchequer Bonds into War Loans		500 0 0
		£22,614 0 9

LIABILITIES.

	£	s.	d.	£	s.	d.	£	s.	d.
To Capital Funds Account—									
As at 31st December, 1916				46,421	2	0			
Less Fees paid by Fellows now deceased				110	5	0			
							46,310	17	0
Life Compositions, 1917							153	6	0
„ Sundry Creditors							1,415	1	6
„ Subscriptions, &c., paid in advance							366	1	9
„ Wisley Scholarships—									
Balance 31st December, 1916							5	4	2
„ Reserve Account—Hall Painting—									
Balance 31st December, 1916				823	13	4			
Added 1917				150	0	0			
							973	13	4
„ Depreciation and Renewals Reserve Account—									
Balance 31st December, 1915				2,477	2	2			
Added 1916 and 1917				526	8	7			
							3,003	10	9
„ Laboratory Prize Fund—									
Balance 31st December, 1916				4	10	2			
Dividends (Nicholson Memorial Fund)				6	9	8			
							10	19	10
„ Williams Memorial Fund							29	17	3
„ Masters Memorial Fund							48	19	4
„ Schröder Pension							7	1	8
„ Lindley Library Trust							10	9	6
„ Pritzel Revision Fund							122	7	3
„ General Revenue Account				43,290	3	11			
„ Capital Expenditure Wisley Gardens	£1,714	10	1						
Loss on Sale of War Stock	138	18	6						
Bad Debts	34	5	3						
				1,887	13	10			
				41,402	10	1			
„ Revenue for the Year, as per annexed Account	£11,678	1	1						
Less Wisley Gardens, Excess of Expenditure over Income	4,224	15	6						
				7,453	5	7			
							48,855	15	8
							£101,313	5	0

SHEET, 31st DECEMBER, 1917. Cr.

ASSETS.

	£	s.	d.	£	s.	d.
By CAPITAL EXPENDITURE—						
,, NEW HALL AND OFFICES—						
As at 31st December, 1916	41,277	13	4			
,, FURNISHING HALL AND OFFICES—						
As at 31st December, 1916 . . .	2,464	9	8			
,, FREEHOLD LAND AND COTTAGES AT WISLEY .	2,260	0	0			
				46,002	3	0
,, APPLIANCES FOR SHOWS				236	11	0
,, SUNDRY DEBTORS AND PAYMENTS MADE IN ADVANCE				2,237	2	6
,, WOKING WATER CO.— Deposit in respect of laying water-mains from Ripley to Wisley Gardens . . .				1,260	0	0
,, FOOD PRODUCTION— Amount due from Board of Agriculture .				730	7	4
,, STOCK ON HAND, WISLEY—Coal and Coke .				189	0	0
,, INVESTMENT of DEPRECIATION and RENEWAL and RESERVE ACCOUNT—						
3½ % India Stock £2,367 18 9 . . *cost*	2,211	12	10			
2½ % Consols £449 19 9 . . . . ,,	265	9	4			
				2,477	2	2
,, INVESTMENTS, as per Schedule . . *at cost* (*In common with most pre-war Securities the above have, for sale purposes, considerably depreciated, but for revenue purposes they bring in the same income as before.*)				46,206	6	8
,, CASH—						
At Bank	372	18	1			
On Deposit	1,500	0	0			
In Hand	101	14	3			
				1,974	12	4
				£101,313	5	0

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position of the Society on the 31st Dec., 1917.

ALFRED C. HARPER, *Auditor*
(HARPER BROTHERS & FEATHER, *Chartered Accountants*),
35 GREAT TOWER STREET, LONDON, E.C.

25th January, 1918.

Dr. WISLEY GARDENS—ANNUAL REVENUE & EXPENDITURE

	£ s. d.	£ s. d.	£ s. d.
To Salaries—			
Wisley Gardens and Research Station			1,779 11 11
,, Rates and Taxes		93 0 10	
,, Water Rate		45 2 0	
,, Insurances		43 1 0	
,, Labour		1,856 17 4	
,, Garden Implements		55 18 3	
,, Loam and Manure		4 8 9	
,, Repairs		195 6 7	
,, Fuel		412 5 4	
,, Miscellaneous Expenses—			
Garden	162 19 7		
Laboratory	45 0 0		
		207 19 7	
,, Gratuities		2 2 0	
,, Cartage		57 2 10	
,, Trees and Shrubs		0 19 4	
			2,974 3 10
,, Cost of Growing, Packing and Distribution of Plants to Fellows			237 17 6
,, Staff Pension		217 16 5	
Less contributed by the Staff, as per scheme		66 9 2	
			151 7 3
,, Depreciation—			
Glass Houses, Plant and Materials			502 3 6
			£5,645 4 0

	£	s.	d.	£	s.	d.
By DIVIDENDS AND INTEREST				1,250	0	3
,, PRODUCE SOLD				127	13	4
,, STUDENTS' FEES				5	5	0
,, CONTRIBUTION from Imperial College of Science .				37	9	11
,, BALANCE, being excess of Expenditure over Revenue				4,224	15	6
				£5,645	4	0

LIABILITIES.

	£	s.	d.	£	s.	d.
To CAPITAL FUNDS ACCOUNT—						
As at 31st December, 1916	31,360	4	3			
Amount transferred from R. H. Society, 31st December, 1917	1,714	10	1			
				33,074	14	4
,, ENDOWMENT FUND				25,000	0	0
,, DEPRECIATION AND RENEWALS—						
As at 31st December, 1915	3,171	1	3			
Added, 1916 and 1917.	680	7	0			
				3,851	8	3
				£61,926	2	7

ASSETS.

		£ s. d.	£ s. d.
By DWELLING HOUSES—			
As at 31st December, 1916		5,807 6 9	
,, GLASS HOUSES, RANGES, POTTING SHED, &c.—			
As at 31st December, 1916		5,202 6 0	
,, LABORATORY—			
As at 31st December, 1916	£18,792 15 6		
Expenditure since	1,709 19 10		
		20,502 15 4	
			31,512 8 1
N.B.—The Wisley Estates are, under the Trust Deed, vested in the Society only so long as it is in the position to use them as an Experimental Garden. The value of the expenditure thereon depends therefore on the continual use of the Garden by the Society.			
,, INVENTORY OF PLANT AND LOOSE EFFECTS—			
As taken by Mr. Chittenden			1,248 6 9
,, MOTOR CAR		100 0 0	
Less Depreciation		50 0 0	
			50 0 0
,, LIBRARY			263 19 6
			33,074 14 4
,, INVESTMENT OF DEPRECIATION AND RENEWALS RESERVE ACCOUNT—			
£2,981 11*s.* 10*d.* 3½% India Stock cost	£2,772 7 0		
£675 8*s.* 3*d.* 2½ % Consols cost	398 14 3		
		3,171 1 3	
Add Cash for Investment, 1916 and 1917		680 7 0	
			3,851 8 3
,, INVESTMENTS—			
Great Eastern Railway Company 4 % Debenture Stock £3,500		3,535 0 0	
Leopoldina Railway Company, Ltd. 5 % Terminable Debentures £2,000		2,000 0 0	
City of Moscow Loan 1912. 4½ % Bonds £6,000		5,730 0 0	
Buenos Ayres Great Southern Railway Company 5 % Non-Cumulative Preference Stock £2,500		2,825 0 0	
War Stock 4½ % 1925–45, £5,000		5,000 0 0	
Canadian Pacific Railway Company 4 % Perpetual Consolidated Debenture Stock, £4,632.		3,890 17 6	
Consols 2½ % £3,229 5*s.* 6*d.*		1,889 2 6	
London County Consolidated 3½% Stock £135 8*s.* 4*d.*		130 0 0	
			25,000 0 0
(In common with most pre-war Securities, the above have, for sale purposes, considerably depreciated, but for revenue purposes they bring in the same income as before.)			
			£61,926 2 7

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position on the 31st Dec., 1917.

ALFRED C. HARPER, *Auditor*
(HARPER BROTHERS & FEATHER, *Chartered Accountants*),
35 Great Tower Street, London, E.C.

25th January, 1918.

Dr.

ALFRED DAVIS

Bequeathed to the Society in 1870 for Annual Prizes,

	£ s. d.	£ s. d.
To Amount of Fund, 31st December, 1916 . .	1,797 8 9	
,, Dividends received 1917		50 7 0

WILLIAMS

Raised by Donations in 1891 in Memory of

	£ s. d.	£ s. d.
To Amount of Fund, 31st December, 1916 . .	204 2 5	
	204 2 5	
,, Balance 31st December, 1916		21 10 10
,, Dividends received 1917		8 6 5
		29 17 3

MASTERS

Raised by Donations in 1908 in Memory of Dr. Masters

	£ s. d.	£ s. d.
To Amount of Fund, 31st December, 1916 . .	542 17 0	
	542 17 0	
,, Balance 31st December, 1916		29 4 4
,, Dividends received 1917		19 15 0
		£48 19 4

NICHOLSON

Raised by Donations in 1908 in Memory of

	£ s. d.	£ s. d.
To Amount of Fund, 31st December, 1916 . .	160 12 11	
,, Dividends received 1917		6 9 8

SCHRÖDER

Provided by Royal Horticultural Society in Memory of the late Baron

	£ s. d.	£ s. d.
To Amount of Fund, 31st December, 1916 . .	557 14 6	
,, Balance 31st December, 1916 . . .		7 11 8
,, Dividends received, 1917		19 10 0
		27 1 8

TRUST FUND. Cr.

or in any other way the Council may determine.

		£ s. d.	£ s. d.
By Consols, £2,022 8s. 9d.	cost	1,797 8 9	
,, Revenue and Expenditure Account			50 7 0

MEMORIAL FUND.

B. S. Williams towards Prizes and Medals.

	£ s. d.	£ s. d.
By East India Railway Co. Annuity, Class B £7	168 0 0	
,, New South Wales Government 4 per cent. Inscribed Stock (1942–62) £36 3s. 1d.	36 2 5	
	204 2 5	
,, Balance in hands of R.H. Society		29 17 3
		29 17 3

MEMORIAL FUND.

towards the Provision of one or more Annual Lectures.

	£ s. d.	£ s. d.
By Midland Railway Consolidated 2½ per cent. Perpetual Preference Stock £400	290 13 6	
,, Midland Railway Consolidated 2½ per cent. Perpetual Guaranteed Preferential Stock £400	252 3 6	
	542 17 0	
,, Balance in hands of R.H. Society		48 19 4
		£48 19 4

MEMORIAL FUND.

George Nicholson for Prizes to Wisley Students.

	£ s. d.	£ s. d.
By Tasmanian Government 4 per cent. Inscribed Stock (1940–50), £162 4s. 5d.	160 12 11	
,, Transfer to Wisley Prize Fund		6 9 8

PENSION.

Schrōder to pay to Gardeners' Royal Benevolent Institution for one Pension.

	£ s. d.	£ s. d.
By Great Western Railway 4 per cent. Debenture Stock £500.	557 14 6	
,, Gardeners' Royal Benevolent Institution		20 0 0
,, Balance in hands of R. H. Society		7 1 8
		27 1 8

	£ s. d.	£ s. d.
To Amount of Fund 31st December, 1916. . . .	6,198 17 7	
,, Contribution from R.H. Society, 31st December, 1917	33 1 3	
	6,231 18 10	
To Balance 31st December, 1916		10 0 0
,, Dividends and Donations received 1917 . .		45 9 6
,, Contribution from R.H. Society, 31st December, 1917		55 0 0
		110 9 6

PRITZEL REVISION

Fund to be raised for the Revision of Pritzel's Iconum

	£ s. d.	£ s. d.
To Amount of Fund, 31st December, 1916. . .	859 2 2	
,, Balance, 31st December, 1916		88 5 1
,, Dividends received, 1917		34 2 2
		122 7 3

	£ s. d.	£ s. d.
By Lancashire and Yorkshire Railway 3 per cent. Consolidated Preference Stock £1,516 held by the Charity Commissioners	1,458 15 7	
,, Value of Library, 31st December, 1916	4,740 2 0	
,, Purchase of Books, 1917 (*See* Report)	33 1 3	
	6,231 18 10	
By Librarian's Salary		100 0 0
,, Balance in hands of R.H. Society		10 9 6
		110 9 6

FUND.

Botanicarum Index. Estimated cost, £3,000.

	£ s. d.	£ s. d.
By India 2½ per cent. Stock, £1,367 13 6	859 2 2	
,, Balance in hands of R.H. Society		122 7 3
		122 7 3

SCHEDULE OF INVESTMENTS.

31st December, 1917.

			£	s.	d.
2½ %	Consols, £5,324 19s. 8d.	cost	5,081	6	0
3 %	Local Loans, £5,800	,,	6,006	16	6
3½ %	Indian Rupee Paper, 37,000 Rupees	,,	2,462	14	4
3½ %	Dominion of Canada Registered Stock (1930–1950), £2,000	,,	2,000	0	0
3½ %	London County Consolidated Stock, £2,864 11s. 8d.	,,	2,884	6	10
3½ %	India Stock £2,063 4s.	,,	2,024	10	4
5 %	Havana Terminal Railroad Company Mortgage Debenture Bonds £8,300	,,	8,946	0	0
4½ %	Central Argentine Railway, Limited, Consolidated Preference Stock £2,800	,,	2,907	3	6
5 %	State of San Paulo Treasury Bonds (1913) £5,000	,,	4,897	13	0
4 %	Central Argentine Railway, Limited, Debenture Stock, £600	,,	537	15	10
2½ %	India Stock, £186 9s.	,,	109	2	2
4 %	Mortgage on Freehold £1,000	,,	1,000	0	0
5 %	War Loan, £7,500	,,	7,348	18	2
			£46,206	6	8

GENERAL MEETING.

February 26, 1918.

Mr. E. A. Bowles, V.M.H., in the Chair.

Fellows elected (55).—F. O. Adcroft, Lady Anderson, Miss D. Athron, Miss H. C. Begg, E. H. Blakesley, W. Boot, G. S. Boothroyd, R. A. Brangwin, R. B. Brooks, Mrs. W. Brown, Sir H. Burt, R. L. Corbett, W. E. Corfield, Mrs. J. L. Cross, A. F. Draper, H. Draper, Rev. G. D. Dunlop, Mrs. L. Francis, James Gibb, Mrs. St. John Gore, S. W. Grimble, H. E. Hadley, W. Hand, Mrs. A. W. Heaton, E. W. J. Hellins, H. Howlett, Rev. C. L. Hulbert, M. Jackson, Mrs. B. Jameson, Miss E. Johnson, Miss N. Kennedy, Rev. F. W. Lace, T. R. Lamb, F. Leighton, Miss H. Lindsay, Lieut.-Col. N. H. S. Lowe, Miss M. McCalmont, Mrs. E. Mathias, Mrs. Money-Kyrle, B. Muscott, Mrs. E. Patterson, J. A. Pegg, Mrs. Regan, S. L. Richards, M. Sargent, Rev. W. H. Seddon, H. B. Sim, J. T. Smith, W. C. Thompson, Miss M. M. Todd, Mrs. M. C. Turner, G. C. Watson, T. West, C. Wightman, A. Wilmore.

Associate (1).—Miss F. A. Gobbold.

Affiliated Societies (8).—Apsley End Allotment Society, Chester Paxton Society, Clent Horticultural Society, Ealing (Boston Road) Allotment Association, Finchley Horticultural Society, Southend-on-Sea Food Production Society, Tuxford and District Allotment Garden Holders' Society, Wombridge Allotment Association.

Mr. F. J. Chittenden, F.L.S., V.M.H., gave a lecture on "The Food Values of Vegetables."

GENERAL MEETING.

March 12, 1918.

Mr. E. A. Bowles, V.M.H., in the Chair.

Fellows elected (60).—G. E. Aldridge, R. Allen, C. G. Ashdown, J. H. Beake, Mrs. J. Belgrave, Miss K. Belshaw, H. Boughey, F. H. Bovey, H. P. Brazier, Miss F. S. Burn, J. E. Cartwright, Miss S. Clark, S. R. Compton, Miss Crosfield, Mrs. B. Dale, Miss E. M. Dykes, Mrs. A. Eade, Major G. M. Ellison, E. P. Evans, J. Firmin, J. W. Fowler, Mrs. F. Fraser, Miss M. C. Goodhall, Miss Griffith-Williams, Captain H. C. Halstead, H. Hayes, W. G. Haywood, Mrs. D. Henty, Mrs. C. H. Hext, A. S. Hill, Mrs. M. Hodgson, Col. I. F. Honeyball, J. Hudson, G. A. V. Humphries, J. F. Johnson, Rev. A. Kuypers, J. F. Lawrence, Miss Llewelyn-Jones, W. Long, Mrs. A. Maitland-Addison, C. J. Marsh, Mrs. C. Menzies, C. E. Mercer, H. R. Morrison, J. Mountford, Jas. Nicol, Mrs. J. R. Pym, S. Routledge, Mrs. E. G. Savile, Col. W. R. Smith, B. H. Smith, C. J. Smith, Rev. G. N. Standish, M. M. Sturdee, C. J. Sturton, Mrs. L. Thorold. J. L. Venables, J. P. Walters, P. W. Wilson, W. Wright.

Fellows resident abroad (5).—D. Allen, J. Flower, H. Reed, Utpal Sircar, Major L. T. Todd.

Associate (1).—A. W. Allcorn.

Affiliated Societies (16).—Aberystwyth Gardens and Allotment Association, Denaby and District Gardens Allotment Association, Enfield Allotments Association, Esher and The Dittons Allotment and Home Production Association, Heywood Horticultural and Allotment Association, Hungerford District Garden Society, Ilkley Allotment Garden Association, Livingstone Road Handsworth Allotment Association, Mirfield Allotment Holders' Association, Ordnance Athletic Recreation Club Society, South Prestwich Allotment Association, Southport Allotment Holders' and Garden Association, Staines Linoleum Horticultural Society, Wembley District Small Holders' Allotment Society, Wyggerton Estate Allotment Association, Wynberg Horticultural Society.

Mr. F. J. Chittenden, F.L.S., V.M.H., gave a lecture on "The Supply of Water to Crops."

GENERAL MEETING.

March 26, 1918.

Mr. R. C. Notcutt in the Chair.

Fellows elected (45).—W. E. Abbott, W. E. Barrett, H. J. Barry, J. H. Batten, J. H. Beswick, R. Blake, J. Brownsett, A. C. Carr, F. S. Curtis, A. Dennett, A. Dickson, C. H. East, Miss Gilstrap, H. W. Grace, G. H. Head, Mrs. H. K. Horne, A. G. Hunt, F. W. Hunt, E. Hymans, Mrs. J. M. Kerrison, A. King, A. H. Marsh, Mrs. M. A. Marshall, Miss E. M. Miskin, H. K. Neale, J. E. Norman, J. North, H. S. Parks, W. G. Powell, E. V. Preston, B. Rhead, F. E. Rice, W. Richardson, H. H. Roberts, H. Ruffler, H. Samways, R. Slack, W. Stevens, Miss E. A. Twigg, Mrs. S. A. Walker, J. Waterkeyn, D. J. Williams, N. W. Wilthew, O. Woodman, Miss H. Young.

Fellows resident abroad (2).—W. W. A. Exler, A. H. Gibbons.

Associate (1).—W. Wesker.

Affiliated Societies (9).—Abergavenny and District Allotment Association, Bambridge Garden Plots Association, Great Crosby Allotment Holders' Association, Great Crosby and Blundellsands Society, Hednesford and District Food Production, Newton Gardeners' Association, Ramsbottom "Central Ward" Allotment Association, Stafford Infirmary Pageant Horticultural Section, Whitstable Horticultural Society.

Mr. F. J. Chittenden, F.L.S., V.M.H., gave a lecture on "The Supply of Earth Salts to Crops."

GENERAL MEETING.

April 9, 1918.

Mr. W. Hales, A.L.S., in the Chair.

Fellows elected (30).—Miss Atkinson, Miss A. Barnard, Miss E. Barnard, J. W. Blackburn, E. S. Blake, Mrs. G. Boardman, C. J. Bond, Mrs. C. Bubb, H. C. Channon, F. Chiesman, Lieut. W. Dauntesey, Miss K. Davis, Mrs. C. Eckford, D. J. Fairbrass, Mrs. P. C. Franks, Miss V. Hartley, Mrs. M. E. Hobbs, W. M. How, Mrs. C. Hunter, E. E. Lowe, H. Marsh, C. Mettam, A. Paton, R. R. Prideaux, Mrs. T. W. Procter, S. Rogers, Morris Sair, J. Salmon, G. Waite, B. H. Wilkinson.

Fellow resident abroad (1).—Mrs. E. Exley.

Associate (1).—Miss J. Walrond-Skinner.

Affiliated Societies (9).—Abercwmboi Horticultural Society, All Saints Amateur Horticultural Society, Broadstone Allotment and Small Holders' Society, Cannock and Rugeley Horticultural Society, Kensington and Chelsea School District Society, Laird Allotment Holders' Association (Plymouth), Latchford Garden Society, Parneley Allotment Association (Leeds), Sherrick Green Allotment Holders' Association.

Mr. F. J. Chittenden, F.L.S., V.M.H., gave a lecture on "The Supply of Nitrogen to Crops."

GENERAL MEETING.

April 23, 1918.

Mr. W. Hales, A.L.S., in the Chair.

Fellows elected (30).—J. F. Anderson, J. E. Cooper, J. L. Cope, Miss J. M. Christie, Mrs. P. Dwyer, Mrs. P. Enthoven, J. W. Fitzwilliam, A. Gray, L. N. Grayshon, G. R. Gregory, A. E. Haarer, W. G. Hall, H. G. Haywood, E. H. Howard, Miss E. Leigh, A. Lilley, Miss C. MacAlee, Miss M. G. Mockler, H. J. Monson, Miss P. M. Owen, Miss C. Pyne, Mrs. E. S. Pyne, Mrs. F. Radcliff, Mrs. E. F. Rissen, T. C. G. Sandford, A. H. Stevenson, Mrs. A. Tranter-Lamb, Mrs. H. Tulloch, F. C. Webb, T. Wilson.

Affiliated Societies (9).—Altrincham, Bowdon, Hale, and District Allotments, Bradford and District Professional Gardens Association, Bungay Gardening Association, Hackney Downs Allotment Holders' Association, Hatfield Cottage

Horticultural Society, Marchwiel Cottage Garden Allotment Society, Shipley Gardeners' Allotment Association, Tenby Allotment Holders' Society, West Drayton and Yiewsley Thrift Society.

Mr. F. J. Chittenden, F.L.S., V.M.H., gave a lecture on "Seed-sowing."

GENERAL MEETING.

May 7, 1918.

Mr. R. C. Notcutt, A.L.S., in the Chair.

Fellows elected (24).—Capt. J. H. Appleby, Mrs. C. G. Ashdown, Miss E. C. Boodle, James Cawthorne, J. W. Chesters, A. Coveney, L. Eagleton, J. F. Ellis, Sir R. W. Essex, W. H. Ferens, B. A. Griffin, Miss L. Gye, Mrs. G. Hann, Mrs. Jones, Mrs. Kerby, G. B. McGrath, R. Morphen, R. H. Page, Miss Rouse-Boughton-Knight, Mrs. Stafford, Miss E. M. Thorne, T. H. Wainwright, H. J. Williams, W. H. Wills.

Fellow resident abroad (1).—A. S. Distin.

Affiliated Societies (3).—Cockton Hill Allotment Society, Ltd., Keswick and District Allotments Association, Kettering Allotments, Ltd.

Mr. F. J. Chittenden, F.L.S., V.M.H., gave a lecture on "The Spacing of Garden Crops."

GENERAL MEETING.

May 28, 1918.

Mr. W. Hales, A.L.S., in the Chair.

Fellows elected (33).—L. H. Barker, W. Barnes, F. Bowers, E. Bradbury, F. Brimicombe, H. Cooper, F. J. F. Crosby, D. S. Crowther, Mrs. E. J. Douglas, Mrs. A. T. Egerton, W. Finch, Mrs. C. Forbes, O. Goldsmith, W. M. Green, J. Hamlin, H. Hawksley, Mrs. M. Henderson-Scott, Col. C. B. Hodgson, F. S. Maton, P. Murphy, J. Pardoe, Lady Parr, Mrs. A. Patterson, Hon. Mrs. C. Pearson, W. R. Pryke, Mrs. H. Stewart, J. Topliss, J. Turner, R. L. Wates, A. G. Wells, F. G. Wigley, Rev. G. Yonge, W. H. Youngman.

Fellows resident abroad (2).—Deoki Nandan, J. C. Wister.

Affiliated Societies (9).—Bagshot and District Mutual Improvement Society, Ferryhill Station Small Holders' Allotment Association, High Trees Plot Holders' Association (Clapham Common), Ivy Allotment Association, Leyton and District Allotment Holders' Society, South Shields Small Holders, Ltd., South Vancouver Horticultural Association, Walton-on-Thames Horticultural Association, Winton and District Amateur Horticultural Society.

Mr. Roberts gave a lecture on "The Forecasting of the Weather."

GENERAL MEETING.

June 18, 1918.

Field-Marshal the Rt. Hon. Lord Grenfell in the Chair.

Fellows elected (36).—W. R. K. Bailey, Mrs. J. W. Batchelor, Mrs. M. Beaumont, F. Betts, Mrs. Butler, W. J. Carey, F. S. Clarke, A. J. Exton, L. Finzel, J. Floyd, T. Gallimore, Rev. A. P. Gold-Levin, G. F. Hallett, A. Harris, H. W. Henshaw, Jas. Hill, E. C. Holder, R. P. Kidd, Mrs. C. H. Kirby, Mrs. V. C. Kirkwood, L. Landrick, Miss L. Lovett, Miss F. E. Marslin, H. Mason, F. M. Maxwell, Mrs. M. Ogilvie, Mrs. Pike, H. D. Richardson, G. Rippener, Mrs. M. Rowat, Duke of Sutherland, Duchess of Sutherland, S. A. Tilley, C. Turner, E. J. Williams, Mrs. W. C. Wright.

Fellow resident abroad (1).—H. L. Dolomore.

Affiliated Societies (4).—Bargoed and Gilfach Allotment Association, Hucknall and District Small Holdings Society, St. Helen's Court Horticultural Society, Thurlstone Allotment and Gardeners' Society.

GENERAL MEETING.

July 2, 1918.

Mr. E. A. Bowles, V.M.H., in the Chair.

Fellows elected (29).—T. A. Beane, Mrs. H. Berger, E. J. Birkin, M. Brooke, Mrs. Carruthers, Miss H. Clifton, Mrs. H. Cowan, A. E. Crawley, F. G. Dale, J. Daniel, F. M. Garnham, H. Hammersley, A. H. Illingworth, L. Laming, J. A. Leete, H. J. Newman, Miss V. Ogilvy, F. C. Puddle, G. B. Randolph, Hon. Mrs. Rendell, H. Reynolds, F. S. Scott-Smith, G. S. Shaw, Mrs. Sotheby, W. W. Standing, A. P. Townley, C. Wigg, Miss Williams, S. F. Williams.

Affiliated Societies (10).—Eltham Allotments Society, Gloucester and District Allotment Holders' Association, High Spen Garden and Allotment Association, Hindley Allotment and Garden Association, Livesey Memorial Hall Horticultural Society, Loughborough Allotment and Garden Holders' Association, Rounds Allotment and Small Holders' Association, Springfield Park and Upper Clapton Society, Tregoyd Velindre and District Horticultural Society, The Beaver Allotment Holders' Association.

Dr. E. J. Russell, F.R.S., gave a lecture on " Soil Making " (see p. 1).

GENERAL MEETING.

July 16, 1918.

Mr. F. J. Hanbury, F.L.S., in the Chair.

Fellows elected (32).—F. E. Crawley, G. H. Dalrymple, E. Durham, Miss J. C. Ede, Miss M. Fletcher, A. Gascoigne, A. Gibbs, Miss F. M. Graham, Mrs. J. F. Ingleby, C. R. Jeffries, E. F. Kempton, H. Kitchen, Miss E. V. Lowis, Brig.-Gen. Maconchy, W. McPherson, Mrs. M. Morrison, C. F. Noble, Rev. T. Phillips, Lieut. R. F. Quirke, Miss M. Robinson, Capt. W. P. Rogers, H. B. Scobell, L. A. Smith, R. J. Smith, Miss W. J. Stanhope, Lady Stephen, Miss Stephen, H. Swan, W. A. Syers, Sir Richard Threlfall, Mrs. M. D. Western, R. Wood.

Affiliated Societies (3).—Allanshaw Street Allotment Holders' Society, Swalwell and District Gardeners' Association, Shotley Bridge Garden and Allotment Association.

GENERAL MEETING.

July 30, 1918.

Field-Marshal the Rt. Hon. Lord Grenfell in the Chair.

Fellows elected (43).—Miss C. Allen, A. M. Amsler, E. W. Barker, C. H. Bastin, J. W. Beastall, R. Biddulph, J. Bowes, Mrs. W. Buckler, Miss B. A. Clough, W. E. Cole, J. J. Dancer, A. J. Gill, H. Goddard, R. Hewitt, R. J. Hose, H. E. Humphreys, J. Jones, C. Laming, Sir Hugh Levick, J. MacGill, J. Maxwell, G. Palmer, C. F. Perowne, H. Pilling, A. E. Prior, G. A. Puzey, C. H. Robinson, W. Rogers, Miss C. S. Sandeman, G. E. Steggall, Mrs. A. W. Tate, Mrs. W. S. Thornton, C. Timson, W. H. Tottle, J. Van-der-Taelen, S. G. Ward, E. H. Watson, J. H. Watts, Mrs. S. Wedderburn, F. Wild, A. Wilkes, F. Winter, C. Wright.

Affiliated Societies (8).—Crewe Allotment Holders' Association, East Leeds and District Allotment Association, Leeds and District Allotment Association, Ormskirk and District Federation Allotment Association, Richmond Allotment Holders' Association, Southborough Food Production Association, Wandsworth Common Bolingbroke Allotment Association, Worcester Agricultural Executive Committee.

MEETING FOR HARDY BRITISH-GROWN FLOWER BULBS.

TUESDAY, JULY 30, 1918.

N.B.—For the purposes of this Meeting Corms and Tubers, such as the Crocuses, Anemones, and the like, may be considered as Bulbs.

* Money prizes presented by Mr. George Monro, Junr., in Classes 3 and 4 were offered, but there were no entries.

Class 3. *Amateurs.*—Collection of 20 varieties of Dry Home-grown Hardy Flower Bulbs, 10 bulbs of each variety. The collection may include not more than 7 varieties of Daffodils, nor more than 6 varieties of Tulips (Darwin or Cottage).

First Prize, £2 10*s.*; Second, £1 10*s.*; Third, £1.

NOTE.—No Exhibitor in Class 3 could exhibit in Class 4.

Class 4. *Amateurs.*—Collection of 10 varieties of Dry Home-grown Hardy Flower Bulbs, 10 bulbs of each variety. The collection may include not more than 3 varieties of Daffodils, nor more than 3 varieties of Tulips (Darwin or Cottage).

First Prize, £2 10*s.*; Second, £1 10*s.*; Third, £1.

Class 5. *Open.*—Collection of 20 varieties of Home-grown Daffodils, 20 "Single" Bulbs of each variety; in a space of 10 ft. × 3 ft.

Silver-gilt Banksian Medal.—Donard Nursery Co., Newcastle, Co. Down.
Silver Flora Medal.—Messrs. J. R. Pearson, Lowdham, Notts.
Silver Banksian Medal.—Messrs. R. H. Bath, Wisbech.

Class 6. *Open.*—Collection of 15 varieties of Home-grown Daffodils, 10 large "Family or cluster" Bulbs of each.

Silver Flora Medal.—Donard Nursery Co.

Class 7. *Open.*—Collection of 10 varieties of Home-grown Market varieties of Daffodils, 20 "Single Bulbs" of each, the collection to include 'Emperor,' 'Empress,' 'Golden Spur,' 'Victoria,' 'Sir Watkin,' '*Barrii conspicuus*,' and '*P. ornatus*'; in a space 7 ft. × 3 ft.

Silver Flora Medal.—J. Mallender, Scrooby, Bawtry.

Class 8. *Open.*—Collection of 20 varieties of Home-grown Early Tulips, 20 bulbs of each, in a space 10 ft. × 3 ft.

Silver-gilt Banksian Medal.—Geo. Monro, Junr., The Malting, Spalding, Lincs (manager, D. Gray).
Silver Flora Medal.—Messrs. R. H. Bath, Wisbech.

Class 9. *Open.*—Collection of 20 varieties of Home-grown May-flowering Tulips (Darwin or Cottage), 20 bulbs of each, in a space 10 ft. × 3 ft.

Silver-gilt Banksian Medal.—George Munro, Junr.
Silver Flora Medal.—Donard Nursery Co.
Silver Banksian Medal.—Messrs. J. R. Pearson.
Silver Banksian Medal.—Messrs. R. H. Bath.
Silver Banksian Medal.—J. Mallender.

Class 10. *Open.*—Collection of any Dry Home-grown Hardy Flower Bulbs, Tubers, Rhizomes, &c., other than Daffodils or Tulips, consisting of not more than 40 varieties, nor more than 30 bulbs &c. of any one kind. Diversity of genera and species to be favourably considered by the Judges; space to be 15 ft. × 3 ft.

No entries.

GENERAL MEETING.

AUGUST 13, 1918.

Mr. F. J. CHITTENDEN, F.L.S., V.M.H., in the Chair.

Fellows elected (27).—J. H. Amery, W. H. Barnes, J. Bintner, W. Boot, J. P. Calfard, G. W. Cowan, W. C. Crisp, M. Daniel, R. Evans, Miss F. E. Franks, Miss M. Gillard, E. C. Hughes, Miss M. Hyslop, Mrs. H. M. Jones, Lieut. F. B. Kenworthy, Dr. J. E. McDougall, Miss M. McJennet, Mrs. M. S. Mackean, E. C. Peace, G. H. Powell, A. J. Roberts, R. Robson, A. F. Scott, J. H. Scrutton, H. C. Sloman, Brig.-Gen. P. E. Thacker, W. H. White.

Fellow resident abroad (1).—A. M. D'Cruz.

Affiliated Societies (2).—Rotherham and District Allotment Holders' Federation, Sheffield and District Allotment Holders' Federation.

Mr. W. H. Morter gave a lecture on "The Future Aims of Allotment Holders in Industrial Centres."

GENERAL MEETING.

AUGUST 27, 1918.

Sir HARRY VEITCH, F.L.S., V.M.H., in the Chair.

Fellows elected (10).—W. Clayton, G. Elgar, F. W. Goode, Mrs. M. Gundry, R. Gundry, Mrs. C. Guthrie, Miss K. Hare, S. Ingham, Mrs. Norman-Roth, W. M. Valon.

Affiliated Societies (4).—Lincoln and District Allotment Holders' Association, Purley Oaks Allotment Holders' Association, Swinton, Pendlebury, and Clifton Friendly Society, Whalley and District Allotment Holders' Association.

GENERAL MEETING.

SEPTEMBER 10, 1918.

Mr. W. H. DIVERS, V.M.H., in the Chair.

Fellows elected (25).—Miss M. S. Campbell, E. Carter, Mrs. A. Craigie, Lieut.-Col. de Watteville, G. W. Fisher, A. J. Fowler, A. Hosking, G. Howard, A. Howitt, Mrs. R. S. Keep, Rev. C. F. Knight, H. Lewis, Mrs. G. Lucas, A. Montague, E. G. Price, Capt. H. Sandeman, Miss H. Smith, Miss W. Smith, T. Smith, G. L. Thomas, W. A. Thomas, L. Torkildsen, Rev. W. B. Trevelyan, Mrs. A. Watney, J. L. Young.

Associate (1).—D. Barnard.

Affiliated Societies (4).—Colne Horticultural Society, Gorringe Park and District Allotment Association, Neath Allotment and Cottage Garden Association, Newport Allotment Association.

GENERAL MEETING.

SEPTEMBER 24, 1918.

Mr. W. H. DIVERS, V.M.H., in the Chair.

Fellows elected (11).—Right Hon. Winston Churchill, F. B. Dawes, H. Dix, Miss B. Flynn, Miss J. W. Hamilton, H. Hird, A. J. Jenkins, J. W. Morton, C. E. Stewart, F. N. Sweet, Miss K. Thomas.

Fellow resident abroad (1).—L. B. Kulkarni.

Associates (2).—Miss M. H. Carrington, J. A. Tambling.

Mr. E. A. Bunyard, F.L.S., gave a lecture on "Cob-Nuts and Filberts."

MEETING FOR VEGETABLES.

SEPTEMBER 24, 1918.

OPEN TO AMATEURS AND GARDENING ESTABLISHMENTS ONLY.

Collections.

N.B.—A competitor can enter in only one of the first three Classes. Arrangement will be taken into consideration by the Judges.

Class 1.—Twelve kinds distinct, to be selected from the subjoined list. Beet, Brussels Sprouts, Cabbage, Broccoli or Cauliflower, Carrots, Celery, Cucumbers, Endive, Leeks, Lettuce, Mushrooms, Onions, Parsnips, Peas, Potatos, Tomatos, Turnips, Beans (Runner or French), Vegetable Marrow.

First Prize, The Sutton Challenge Cup (Value £21) and £5. Second, £4; Third £3.

The winner will hold the Cup for one year subject to a sufficient insurance against loss, and a guarantee of its return in good condition, or failing this to refund to the R.H.S. the sum of £25. An Exhibitor may win the Cup only once in 3 years, but the winner may compete the following year, and if adjudged first in these two successive years will receive a smaller commemorative cup.

1. W. H. Myers, Esq., Swanmore, Bishops Walsham (G. Ellwood).
2. Duke of Wellington, Strathfieldsaye, Mortimer (E. Matthews).
No Third.

Class 2.—Nine kinds distinct, to be selected from the list in Class 1.

The object of this Class is to illustrate not only those vegetables which are in daily use, but specially the quality and size in which they are most acceptable and useful for table use and possess the qualities most valued for table use by cooks.

N.B.—The Judges were authorized to disqualify any exhibit which they considered not to contain the most suitable vegetables, or to contain specimens not in the most suitable condition in regard to size and quality for table use.

In 1913 these Prizes were withheld on account of the excessive size of the specimens, the Judges considering them too large for table use, except perhaps in hotels and restaurants.

First Prize, The Gordon Lennox Challenge Cup and £4; Second, £3; Third, £2.

1. Mrs. Jenner, Wenvoe Castle, Cardiff (H. Wheeler).
2. E. E. Palmer, Esq., Drayton House, Sherfield-on-Lodden, Basingstoke (H. E. Wallis).
3. Hon. Mrs. Greville, Polesden Lacey, Dorking (H. Prince).

Class 3.—Six kinds distinct, to be selected from the list in Class 1.

First Prize, £3; Second, £2; Third, £1.

1. —
2. James S. Kelly, Esq., Claremont, Esher.
3. George Thorn, Esq., Willesborough, Kent (gr. M. Hoad).

Class 4. Potatos, collection of twelve varieties distinct.

First Prize, £3; Second, £2; Third, £1.

1. George Thorn, Esq.
2. A. Thomas, Esq., Kingsnorth, Ashford, Kent.
3. C. A. Cain, Esq., The Node, Welwyn (T. Pateman).

Class 5.—Potatos, collection of 6 varieties distinct.

First Prize, £1 10*s.*; Second, £1; Third, 10*s.*

1. F. G. Hoad, Esq., Willesborough, Kent.
2. A. G. McMeekin, Esq., Boulter's Lock, Maidenhead (J. Cox).
3. Rev. J. R. Leigh, Yalding Vicarage, Kent (G. Johnson).

Class 6.—Onions, collection of 6 varieties distinct, as follows:

Two dishes of the 'Ailsa Craig' type, one oval and the other round; 1 dish of Red Onions; 1 dish of Silverskins; 1 dish of James' or other selection of long-keeping brown globe Onions; 1 dish of White Spanish or Nuneham Park type (flat, not globe).

N.B.—More than 2 dishes of selections of Ailsa Craig type, or varieties indistinguishable from it will disqualify.

First Prize, £2; Second, £1; Third, 10*s.*

1. Mrs. Jenner.
2. W. H. Myers, Esq.
No Third.

Class 7.—Salads, collection of 6 kinds distinct, each kind to be staged separately.

First Prize, £2; Second, £1; Third, 15*s.*

1. Duke of Wellington.
2. W. H. Myers, Esq.
3. E. E. Palmer, Esq.

Single Dish Classes for Amateurs.

In Classes 8–38 the First Prize is in each case 10*s.*, the Second, 7*s.* 6*d.*, Third, 5*s.* The specimens shown in each Class must be always of one and the same variety.

Class 8.—Beans, Scarlet Runners.

1. Mrs. Jenner.
2. W. H. Myers, Esq.
3. Right Hon. T. F. Halsey, Gaddesden Place, Hemel Hempstead (gr. T. Avery).

Class 9.—Beans, French Climbers.
1. Duke of Wellington.
2. E. E. Palmer, Esq.
3. Hon. Mrs. Greville.

Class 10.—Beans, French Dwarf.
1. Duke of Wellington.
2. J. S. Kelly, Esq.
3. Hon. Mrs. Greville.

Class 11.—Beet, Globe type.
1. Hon. Mrs. Greville.
2. J. B. Fortescue, Esq., Dropmore, Maidenhead (C. Page).
3. Mrs. Jenner.

Class 12.—Beet, Long type.
1. Mrs. Jenner.
2. Duke of Wellington.
3. —

Class 13.—Brussels Sprouts, 50 buttons.
1. Mrs. Jenner.
2. R. Staward, Esq., Panshanger, Herts.
3. J. S. Kelly, Esq.

Class 14.—Brussels Sprouts, 3 plants.
1. Mrs. Jenner.
2. Duke of Wellington.
3. R. Staward, Esq.

Class 15.—Cabbage.
1. Duke of Wellington.
2. J. S. Kelly, Esq.
3. R. Staward, Esq.

Class 16.—Cabbage, Savoy.
1. E. E. Palmer, Esq.
2. J. S. Kelly, Esq.
3. Duke of Wellington.

Class 17.—Cauliflower or Broccoli.
1. —
2. W. H. Myers, Esq.
3. Duke of Wellington.

Class 18.—Celeriac.
No entries.

Class 19.—Celery, White.
1. —
2. Duke of Wellington.
3. E. E. Palmer, Esq.

Class 20.—Celery, Red.
1. —
2. W. H. Myers, Esq.
3. E. E. Palmer, Esq.

Class 21.—Cucumbers.
1. —
2. Duke of Wellington.
3. E. E. Palmer, Esq.

Class 22.—Leeks.
1. —
2. Mrs. Jenner.
3. W. H. Myers, Esq.

Class 23.—Marrows.
1. Duke of Wellington.
2. —
3. Hon. Mrs. Greville.

Fig. 34.—Ruhleben Horticultural Society, Flower Show, April 1917.

[*To face p.* xxxii.

Fig. 35.—Ruhleben Horticultural Society, Flower Show, April 1917.

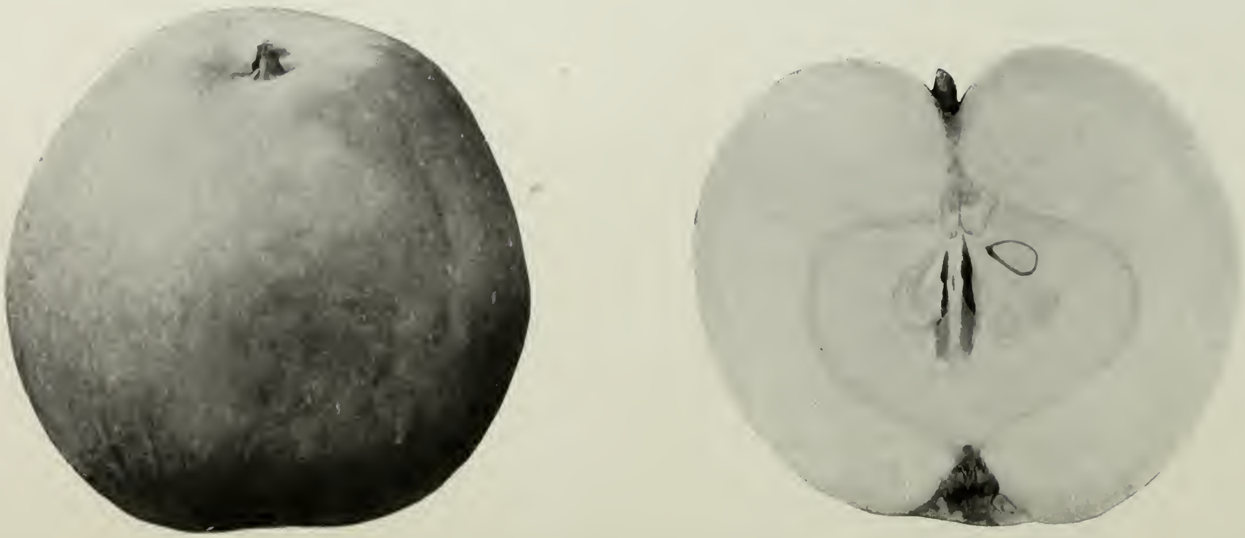

Fig. 36.—Apple 'St. Cecilia.'
(p. lv.)

[To face p. xxxiii.

Class 24.—Mushrooms.
No First.
No Second.
3. W. H. Myers, Esq.

Class 25.—Onions.
1. Mrs. Jenner.
2. W. H. Myers, Esq.
3. —

Class 26.—Parsnips.
1. Duke of Wellington.
2. E. E. Palmer, Esq.
3. Hon. Mrs. Greville.

Class 27.—Carrots, Long.
1. Mrs. Jenner.
2. E. E. Palmer, Esq.
3. Hon. Mrs. Greville.

Class 28.—Carrots, stump-rooted or short.
1. Mrs. Jenner.
2. E. E. Palmer, Esq.
3. Duke of Wellington.

Class 29.—Peas.
1. Duke of Wellington.
2. E. E. Palmer, Esq.
3. —

Class 30.—Turnips, White Skin and Flesh.
1. Rt. Hon. T. F. Halsey.
2. E. E. Palmer, Esq.
3. Hon. Mrs. Greville.

Class 31.—Turnips, purple-top, red-top, or green-top, flesh white
1. Rt. Hon. T. F. Halsey.
2. W. H. Myers, Esq.
3. Duke of Wellington.

Class 32.—Turnips, yellow flesh.
1. —
2. Mr. W. H. Holloway, Port Hill Gardens, Shrewsbury.
3. Hon. Mrs. Greville.

Class 33.—Potatos, White.
1. Rt. Hon. T. F. Halsey.
2. G. Thorn, Esq.
3. Duke of Wellington.

Class 34.—Potatos, coloured.
1. G. Thorn, Esq.
2. F. G. Hoad, Esq.
3. J. B. Fortescue, Esq.

Class 35.—Kale, Curled.
1. —
2. Mr. W. H. Holloway.
3. Hon. Mrs. Greville.

Class 36.—Tomatos, Red.
1. Mrs. Jenner.
2. W. H. Myers, Esq.
3. —

Class 37.—Tomatos, Yellow.
1. Duke of Wellington.
2. Mrs. Jenner.
3. R. Staward, Esq.

Class 38.—Any other Vegetable not named in the Schedule
1. J. S. Kelly, Esq.
2. R. Staward, Esq.
3. E. E. Palmer, Esq.

GENERAL MEETING.

October 8, 1918.

Mr. W. A. Bilney in the Chair.

Fellows elected (41).—R. A. Bailey, Lieut. R. F. Bennett, F. T. Bircham, S. Brocklehurst, W. D. Clark, Miss W. Dawson, A. de Lafontaine, Mrs. H. Ellis, E. T. England, Miss A. C. Fagge, W. E. Frederick, E. H. Gillett, Mrs. C. E. Greenall, H. A. Hanson, R. C. Harrison, T. W. Hazelby, F. S. Holmes, H. R. Jennings, J. A. Jones, Mrs. C. F. Johnson, A. S. Juniper, T. M. Lloyd, H. Nuttall, E. E. Palmer, A. E. Passingham, W. Pearson, W. E. Phillips, W. G. Phillips, E. R. Pratt, J. A. Pruen, Miss A. Rodocanachi, T. H. Rose, W. W. Rose, Miss E. J. Rothwell, B. W. Russell, E. W. Stedman, W. H. Tyzack, G. Whitehouse, J. E. Williams, Miss M. F. Williamson, W. Wilson.

Fellows resident abroad (2).—W. Kinley, R. E. Fischer.

Associate (1).—J. Mills.

Affiliated Societies (3).—East Croydon and Addiscombe Allotment Society, London General Omnibus Co. Employees Society, Warstock Allotment Association.

Mr. J. Cheal, V.M.H., gave a lecture on "Old Gardens and their Restoration."

TWENTY-SECOND MEETING FOR BRITISH-GROWN FRUITS.

October 8, 1918.

DIVISION I.

Fruits grown under Glass or Otherwise.

OPEN TO GARDENERS AND AMATEURS ONLY.

Note.—Competitors were permitted to enter in one Class only of Classes 1, 2, and of Classes 3, 4.

Class 1.—Collection of nine dishes of ripe dessert fruit, 6 kinds at least; only 1 Pine, 1 Melon, 1 Black and 1 White Grape, allowed; not more than 2 varieties of any other kind and no two dishes of the same variety.

First Prize, Silver Hogg Medal and £5; Second, £4; Third, £3.

1. C. A. Cain, Esq., The Node, Welwyn (T. Pateman).
2. Duke of Newcastle, Clumber, Worksop (S. Barker).
3. Mr. J. Lock, Oaklands Lodge Gardens, Weybridge.

Class 2.—Collection of 6 dishes of ripe dessert fruit, 4 kinds at least; only 1 Melon, 1 Black and 1 White Grape, allowed; not more than 2 varieties of any other kind and no two dishes of the same variety. Pines excluded.

First Prize, Silver Knightian Medal and £3; Second, £2; Third, £1 10*s.*

1. Lord Hillingdon, Wildernesse, Sevenoaks (J. Shelton).
2. Duke of Wellington, Strathfieldsaye, Mortimer (E. Matthews).
3. G. Miller, Esq., Newberries, Radlett (J. Kidd).

Class 3.—Grapes, 6 distinct varieties (2 bunches of each), of which two at least must be White.

First Prize, Silver Hogg Medal and £5; Second, £4; Third, £3.

1. G. Miller, Esq.
2. Duke of Newcastle (S. Barker).
3. C. A. Cain, Esq.

Class 4.—Grapes, four varieties (2 bunches of each), selected from the following: 'Madresfield Court,' 'Prince of Wales,' 'Muscat Hamburgh,' 'Muscat of Alexandria' or 'Canon Hall' (not both), 'Mrs. Pearson,' and 'Dr. Hogg.'

First Prize, Silver Knightian Medal and £3; Second, £2; Third, £1 10*s.*

1. Lord Hillingdon.

No other entries.

Class 5.—Grapes, 'Black Hamburgh,' 2 bunches.

First Prize, £2; Second, £1 10*s.*; Third, £1.

1. Lord Hillingdon.
2. Duke of Newcastle.
3. Lord Hillingdon, Hillingdon Court, Uxbridge (A. R. Allan).

Class 6.—Grapes, 'Mrs. Pince,' 2 bunches.

First Prize, £2; Second, £1 10s.

1. Lord Hillingdon (J. Shelton).
2. Duke of Newcastle.

Class 7.—Grapes, 'Alicante,' 2 bunches.

First Prize, £2; Second, £1 10s.

1. W. Raphael, Esq., Castle Hill, Englefield Green (H. H. Brown).
2. Duke of Wellington.

Class 8.—Grapes, 'Madresfield Court,' 2 bunches.

First Prize, £2; Second, £1 10s.

1. Duke of Newcastle.
2. Lord Hillingdon (J. Shelton).

Class 9.—Grapes, 'Prince of Wales,' 2 bunches.

First Prize, £2; Second, £1 10s.

1. W. H. Nockolds, Esq., Nutfield Court, Redhill (T. W. Herbert).
2. Duke of Newcastle.

Class 10.—Grapes, any other Black Grape, 2 bunches. (The name of the variety to be stated on both the Entry Form and the label.)

First Prize, £2; Second, £1 10s.

1. Duke of Newcastle, 'Muscat Hamburgh.'
2. Lord Hillingdon (J. Shelton), 'Muscat Hamburgh.'

Class 11.—Grapes, 'Muscat of Alexandria,' 2 bunches.

First Prize, Silver Knightian Medal and £2; Second, £2; Third, £1 10s.

1. Mr. James Lock.
2. Duke of Newcastle.
3. C. A. Cain, Esq.

Class 12.—Grapes, any other White Grape, 2 bunches. (The name of the variety to be stated on both the Entry Form and the Label.)

First Prize, £2; Second, £1 10s.

1. Duke of Newcastle, 'Canon Hall.'
2. Lady Tate, Park Hill, Streatham Common (W. Howe), 'Dr. Hogg.'

Class 13.—Collection of hardy fruits, in a space not exceeding 12 × 3.
Thirty dishes distinct, grown entirely in the open; not more than 12 varieties of Apples or 8 of Pears.

First Prize, Silver Hogg Medal and £2; Second, £2.

1. R. Staward, Esq., Panshanger, Hertford.

No other entry.

DIVISION II.

OPEN TO NURSERYMEN ONLY.

Allotment of Table-space will be ma e on the following scales :—

FOR FRUIT GROWN ENTIRELY OUT OF DOORS.

Class 14.—30 feet run of 6 feet tabling.

Gold Medal.—Messrs. Cannell, The Nurseries, Eynsford, Kent.
Silver-gilt Knightian Medal.—Messrs. W. Seabrook, The Nurseries, Chelmsford.

Class 15.—20 feet run of 6 feet tabling.

Silver-gilt Knightian Medal.—Messrs. H. Close, Orpington.
Silver-gilt Banksian Medal.—Messrs. S. Spooner, Hounslow.

DIVISION III.

OPEN TO MARKET GROWERS ONLY.

Class 16.—Apples, 20 baskets of (cooking and dessert, distinct).

Fruit suitable for market purposes will have more consideration than a large number of varieties.

The size of the baskets to be limited to half-bushels if round, to grape (baby) baskets if rectangular.

Silver Cup or Medals at the discretion of the Council.

Gold Medal.—Col. Honeyball, Teynham, Kent.
Silver-gilt Knightian Medal.—Lieut.-Col. Lumley, Upchurch, Kent.
Silver Knightian Medal.—Messrs. J. Nash, East Horsley, Surrey.

DIVISION IV.

Class 17.—Apples, 24 dishes distinct, 16 cooking, 8 dessert. The latter to be placed in the front row.

First Prize Fruiterers' Company Silver-gilt Medal and £3; Second, £3; Third, £2.

1. J. Liddell, Esq.
2. R. Staward, Esq.
3. C. A. Cain, Esq.

Class 18.—Apples, 12 dishes distinct, 8 cooking, 4 dessert. The latter to be placed in the front row.

First Prize, Fruiterers' Company Silver Medal and £2; Second, £1.

No entries.

Class 19.—Cooking Apples, 6 dishes distinct.

First Prize, £1; Second, 15*s.*

1. C. A. Cain, Esq.

No other entries.

Class 20.—Dessert Apples, 6 dishes distinct.

First Prize, £1; Second, 15*s.*

1. C. A. Cain, Esq.

No other entries.

Class 21.—Dessert Pears, 18 dishes distinct.

First Prize, Silver-gilt Knightian Medal and £2; Second, £2; Third £1.

No entries.

Class 22.—Dessert Pears, 9 dishes distinct.

First Prize, £1 10*s.*; Second, £1.

1. C. A. Cain, Esq.
2. J. Liddell, Esq.

Class 23.—Plums, 3 dishes distinct.

First Prize, £1; Second, 10*s.*

1. C. H. Berners, Esq., Wolverstone Park, Ipswich (W. Messenger).

No Second.

Class 24.—Damsons, or Bullaces, 3 dishes distinct.

First Prize, 10*s.*; Second, 7*s.* 6*d.*

1. F. G. Gerrish, Esq., Pendley Manor, Tring.

No second.

Class 25.—Morello Cherries, 50 fruits.

First Prize, 7*s.*; Second, 5*s.*

1. F. G. Gerrish, Esq.

No second.

Class 26.—Autumn Raspberries, 1 dish of 50 fruits.

First Prize, 7*s.*; Second, 5*s.*

1. E. E. Palmer, Esq., Drayton House, Basingstoke (H. E. Wallis).
2. C. H. Berners, Esq.

DIVISION V.

Special District County Prizes.

OPEN TO GARDENERS AND AMATEURS ONLY.

(In this Division all fruit must have been grown entirely in the open.)

N.B.—Competitors in Division V. must not compete in Divisions II. or III., or in Classes 1, 2, 3, 4, 13, 17, 18, 19, 21, 22.

Class AA.—Apples, six dishes distinct, 4 cooking, 2 dessert.

First Prize, £1 and 3rd class Single Fare from Competitor's nearest railway station to London.

Second Prize, 15*s.* and Railway Fare as above.

Class BB.—Dessert Pears, 6 dishes distinct.

First Prize, £1 10*s.* and Railway Fare as above.

Second Prize, £1 and Railway Fare as above.

The two above Classes Nos. AA and BB are repeated eleven times as follows, and Competitors must enter for them thus :—" Class AA 27 " or " BB 28," and so on, to make it quite clear whether they mean Apples or Pears.

Class 27.—Open only to Kent growers.

Apples.—no entries.
Pears.—no entries.

Class 28.—Open only to growers in Surrey, Sussex, Hants.

Apples.

1. Major G. Hennessy, Tylney Hall, Winchfield (J. Hygate).

No second.
Pears.—No entries.

Class 29.—Open to growers in Wilts, Dorset, Somerset, Devon, and Cornwall.

Apples.

1. John Copp, Esq., Ferndale, Teignmouth.

No second.
Pears.—No entries.

Class 30.—Open only to growers in Gloucester, Oxford, Bucks, Berks, Beds, Herts and Middlesex.

Apples.

1. Sir Edward Pearson, Brickendonbury, Herts (W. Stephenson).
2. Miss Musgrave, The Dell, Hertingfordbury (W. Watkins).

Pears.

1. Sir Edward Pearson (W. Stephenson).
2. J. B. Fortescue, Esq., Dropmore, Maidenhead (C. Page).

Class 31.—Open only to growers in Essex, Suffolk, Norfolk, Cambridge, Hunts, and Rutland.

Apples.

1. Sir Montagu Turner, Bedfords, Havering, Romford (A. J. Barratt).
2. C. H. Berners, Esq.

Pears.

1. C. H. Berners, Esq.
2. No second.

Class 32.—Open only to growers in Lincoln, Northampton, Warwick, Leicester, Notts, Derby, Staffs, Shropshire, and Cheshire.

Apples.

Apples.—No entries.
Pears.—No entries.

Class 33.—Open only to growers in Worcester, Hereford, Monmouth, and Wales.

Apples.—No entries.
Pears.—No entries.

Class 34.—Open only to growers in the six northern counties of England, and in the Isle of Man.

Apples.

1. William Orr, Silverdale, via Carnforth.
2. J. Cocker, Chester Gardens, Humshaugh.

Pears.—No entries.

Class 35.—Open only to growers in Scotland.

Apples.

1. Capt. Gordon, Castle Douglas, Kirkcudbright (Jas. Duff).
2. No second.

Pears.—No entries.

Class 36.—Open only to growers in Ireland.

Apples.

1. Earl of Bessborough, Piltown, co. Kilkenny (T. E. Tomalin).
2. Lady Eva Wyndham Quin, Carrick-on-Suir, Kilkenny (C. Garner).

Pears.—No entries.

Class 37.—Open only to growers in the Channel Islands.

Apples.—No entries.
Pears.—No entries.

DIVISION VI.

Single Dishes of Fruit grown entirely in the Open Air:

Six fruits to a dish.

OPEN TO GARDENERS AND AMATEURS ONLY.

' Nurserymen and Market Growers excluded.

All the Varieties named in Division VI. are excellent and worthy of genera cultivation.

Prizes in each Class, except 56, 57, 80, 103, and 104, as follows :—

First Prize, 7*s.* ; Second Prize, 5*s.* ; but when the entries exceed six in any Class the Judges may at their discretion recommend a Third Prize of 4*s.*

Choice Dessert Apples.

N.B.—The Judges are instructed to prefer Quality, Colour, and Finish to mere size.

(A Competitor may stage only one dish in each Class.)

Class 38.—Adams' Pearmain.

1. J. B. Fortescue, Esq.
2. Major Hennessy.
3. Mr. J. T. Tubb, Bearwood Gardens, Wokingham.

Class 39.—Allington Pippin.

1. Sir Edward Pearson.
2. G. F. Marsh, Esq., Marchmont Road, Wallington.
3. Miss Musgrave (W. Warkins).

Class 40.—American Mother.

No entries.

Class 41.—Barnack Beauty.

1. W. H. Nockolds, Esq.
2. J. B. Fortescue, Esq.

Class 42.—Ben's Red.

No entries.

Class 43.—Blenheim Orange.

1. Duke of Wellington.
2. Major Hennessy.

Class 44.—Charles Ross.

1. E. E. Palmer, Esq.
2. Major Hennessy.
3. G. F. Marsh, Esq.

Class 45.—Claygate Pearmain.

1. G. F. Marsh, Esq.
2. Sir Edward Pearson.

Class 46.—Cox's Orange.

1. Mr. J. T. Tubb.
2. L. Green, Esq., The Priory, Harrow Weald
3. Sir Edward Pearson.

Class 47.—Egremont Russet.

1. J. B. Fortescue, Esq.
2. Major Hennessy.

Class 48.—James Grieve.

1. John Copp, Esq.
2. J. B. Fortescue, Esq.

Class 49.—Lord Hindlip.

1. Earl of Bessborough.

No second.

Class 50.—Margil.

1. John Copp, Esq.
2. Sir Edward Pearson.

Class 51. Ribston Pippin.
1. Major Hennessy.
2. G. F. Marsh, Esq.
3. Duke of Wellington.

Class 52.—Rival.
1. Major Hennessy.
2. Lady Eva Wyndham Quin.

Class 53.—Roundway Magnum Bonum.
1. J. B. Fortescue, Esq.
No second.

Class 54.—St. Edmund's Pippin.
1. G. F. Marsh, Esq.
No second.

Class 55.—Wealthy.
1. Earl of Bessborough.
No second.

Class 56.—Eight fruits of any early variety, not named above, fit for use.
Four Prizes, 7*s*., 6*s*., 5*s*., 4*s*.
1. E. E. Palmer, Esq.
2. J. B. Fortescue, Esq.
3. Sir Montagu Turner.
4. John Copp, Esq.

Classes 57–8.—Fruits of any late variety, not named above.
Four Prizes, 7*s*., 6*s*., 5*s*., 4*s*.
1. Major Hennessy.
2. Duke of Wellington.
3. John Copp, Esq.
4. J. T. Tubb, Esq.

A Competitor may enter only one variety in Classes 56 and 57, in which Classes eight Fruits must be placed in each dish for the Judge to be able to taste two of them ; the name of the variety must be given on the Entry Form.

Choice Cooking Apples.

Note.—That many Cooking Apples if kept long enough make very fair Dessert fruits, as for example Blenheim, Gascoyne's Scarlet, &c. ; and also, *vice versa*, many Dessert Apples make, early in the season, very fair cookers, Charles Ross for example.

First Prize, 7*s*. ; Second, 5*s*. ; but when the entries exceed six in any Class the Judges may, at their discretion, recommend a Third Prize of 4*s*.

N.B.—The Judges are instructed to prefer Quality and Size to mere Colour.

Class 58.—Beauty of Kent.
No entries.

Class 59.—Bismarck.
1. Sir Montagu Turner.
2. Sir Edward Pearson.

Class 60.—Blenheim Orange (large fruits).
1. Major Hennessy.
2. C. H. Combe, Esq., Cobham Park, Cobham, Surrey (G. A. Kember).

Class 61.—Bramley's Seedling.
1. Major Hennessy.
2. Duke of Wellington.
3. Sir Montagu Turner.

Class 62.—Dumelow's seedling, *syns*. Wellington and Normanton Wonder.
1. Sir Montagu Turner.
2. Major Hennessy.

Class 63.—Ecklinville.
1. R. Collard, Esq., Kynnersley, Shenfield.
No second.

Class 64.—Edward VII.
1. Mr. J. T. Tubb.
No second.

Class 65.—Emneth Early, *syn.* Victoria.
No entries.

Class 66.—Emperor Alexander.
1. Sir Edward Pearson.
2. Major Hennessy.

Class 67.—Gascoyne's Scarlet (large fruits).
1. C. H. Combe, Esq.
2. Sir Edward Pearson.

Class 68.—Golden Noble.
1. Mr. J. T. Tubb.
2. Sir Edward Pearson.

Class 69.—Grenadier.
1. Earl of Bessborough.
2. J. B. Fortescue, Esq.

Class 70.—Lane's Prince Albert.
1. Major Hennessy.
2. Duke of Wellington.
3. Earl of Bessborough.

Class 71.—Lord Derby.
1. Major Hennessy.
2. Earl of Bessborough.

Class 72.—Mère de Ménage.
1. Major Hennessy.
2. Sir Edward Pearson.

Class 73.—Newton Wonder.
1. Duke of Wellington.
2. W. A. Nightingale, Esq., Marchmont Road, Wallington.

Class 74.—Peasgood's Nonesuch.
1. Major Hennessy.
No second.

Class 75. Potts' Seedling.
No entries.

Class 76.—Rev. W. Wilks.
No entries.

Class 77.—Stirling Castle.
1. G. F. Marsh, Esq.
2. Sir Edward Pearson.

Class 78.—The Queen.
1. Major Hennessy.
2. Earl of Bessborough.

Class 79.—Warner's King.
1. Earl of Bessborough.
2. Sir Edward Pearson.
3. G. F. Marsh, Esq.

Class 80.—Fruits of any variety not named above.

Four Prizes, 7*s*., 6*s*., 5*s*., 4*s*.

A Competitor may only enter one variety in Class 80, in which Class eight Fruits must be placed in each dish for the Judges to be able to taste two of them the name of the variety must be given on the Entry Form and Label.

1. Earl of Bessborough.
2. Sir Montagu Turner.
3. Duke of Wellington.
4. W. H. Nockolds, Esq.

Choice Dessert Pears.

First Prize, 7*s.*; Second, 5*s.*; but when the entries exceed six in any Class, the Judges may, at their discretion, recommend a Third Prize of 4*s.*

Class 81.—Beurré d'Anjou.
1. J. B. Fortescue, Esq.
No second.

Class 82.—Beurré Dumont.
No entries.

Class 83.—Beurré Bosc.
1. C. H. Berners, Esq.
No second.

Class 84.—Beurré Hardy.
1. C. H. Berners, Esq.
No second.

Class 85.—Beurré Superfin.
1. C. H. Berners, Esq.
2. Major Hennessy.

Class 86.—Charles Ernest.
1. C. H. Berners, Esq.
2. C. H. Combe, Esq.

Class 87.—Conference.
1. H. Shipley, Esq., The Bungalow, Cobham.
2. C. H. Combe, Esq.

Class 88.—Doyenné du Comice.
1. Duke of Wellington.
2. H. Shipley, Esq.

Class 89.—Durondeau.
1. C. H. Berners, Esq.
2. Mr. James Lock.

Class 90.—Easter Beurré
1. C. H. Berners, Esq.
No second.

Class 91.—Emile d'Heyst.
No entries.

Class 92.—Fondante d'Automne.
1. Sir Montagu Turner.
No second.

Class 93.—Fondante de Thirriot.
1. C. H. Berners, Esq.
2. J. B. Fortescue, Esq.

Class 94.—Glou Morceau.
1. C. H. Berners, Esq.
2. C. H. Combe, Esq.

Class 95.—Joséphine de Malines.
1. C. H. Berners, Esq.
2. Major Hennessy.

Class 96.—Louise Bonne of Jersey.
1. C. H. Combe, Esq.
2. Sir Montagu Turner.

Class 97.—Marie Louise.
No entries.

Class 98.—Nouvelle Fulvie.
No entries.

Class 99.—Pitmaston Duchess.
1. C. H. Berners, Esq.
2. Mr. J. T. Tubb.
3. W. H. Nockolds, Esq.

Class 100.—Souvenir du Congrès.
No entries.

Class 101.—Thompson.
1. Duke of Newcastle.
No second.

Class 102.—Winter Nélis.
No entries.

Class 103.—Eight fruits of any Early Variety not named above.
Four Prizes, 7*s*., 6*s*., 5*s*., 4*s*.
1. Mr. Jas. Lock.
2. C. H. Berners, Esq.
No other awards.

Class 104.—Eight fruits of any late Variety not named above.
Four Prizes, 7*s*., 6*s*., 5*s*., 4*s*.
1. C. H. Berners, Esq.
2. C. H. Combe, Esq.
No other awards.

A competitor may enter only one variety in Classes 103 and 104, in which Classes eight fruits must be placed in each dish for the Judges to be able to taste two of them ; the name of the variety must be given on the Entry Form and Label.

FRUIT COMPETITION FOR AFFILIATED SOCIETIES.

Affiliated Societies Challenge Cup.

Apples and Pears.

Six dishes, distinct, Cooking Apples ; six dishes, distinct, Dessert Apples ; six dishes, distinct, Dessert Pears, six fruits to each dish. No two Societies may combine, and each Society competing must collect all the specimens shown from amongst their own members only, and not from outside. Eight days' notice must be given of intention to compete.

First, Challenge Cup to be held for 12 months, and Silver-gilt Knightian Medal; Second, Silver-gilt Banksian Medal.

The Cup may be won only once in three years by any one Society ; but the Winners may compete for any other prizes offered in this Class.

Challenge Cup to Knebworth and District Horticultural Improvement Society. C. H. Sands, Secretary, Milestone Road, Knebworth.

DEPUTATION TO SOUTHAMPTON.

A deputation consisting of Sir Daniel Morris, K.C.M.G., D.Sc., D.C.L., V.M.H., Mr. Arthur W. Sutton, V.M.H., F.L.S., Mr. James Hudson, V.M.H., and Rev. W. Wilks, M.A., V.M.H., Secretary, visited the Autumn Show of the Southampton Royal Horticultural Society on October 15, 1918. They were most courteously received the evening before at the station and conducted to the residences of Professor Lytell, the President, and Mr. Fuidge, the Secretary of the Southampton Society, where they received most hospitable entertainment.

In the morning the Deputation very carefully inspected an excellent Show, chiefly of Vegetables and Fruit tastefully arranged in the Pavilion on the Royal Pier, after which they were entertained at luncheon together with the Judges, Committee, &c., at which the Mayor of Southampton presided. After the usual loyal toast the Mayor called on Sir Daniel Morris to propose the health of Mr. Fuidge who had been for fifty years officially connected with the Southampton Society. When Mr. Fuidge had responded the Mayor proposed the health of the Deputation, wishing prosperity to the Royal Horticultural Society of Great Britain and thanking the Council for sending the Deputation. To this the Rev. W. Wilks responded. Mr. Sutton then proposed the health of officers of the Southampton Society, together with the Judges and Exhibitors, and Professor Lytell, the President of the Society, in responding proposed a hearty vote of thanks to the Mayor for presiding.

The company then returned to the Pavilion where, accompanied by the Mayoress, the Mayor in an excellent address on the value of the Allotment-Vegetable-effort being made throughout the country, and with renewed thanks to the R.H.S. and to the members of the Deputation, formally declared the Show open.

W. W.

The following awards were made at the Show :—

Gold Medal.

To Messrs. Toogood, for vegetables.

Silver-gilt Flora Medal.

To Messrs. Ladhams, for flowers and plants.

Silver-gilt Knightian Medal.

To His Grace The Duke of Wellington (gr. Mr. Matthews), for fruit. (Class 60.)

Silver-gilt Banksian.

To W. H. Myers, Esq. (gr. Mr. Ellwood), for vegetables. (Class 53.)
To Eustace Palmer, Esq. (gr. Mr. Wallis), for vegetables. (Class 53.)

Silver Knightian.

To His Grace The Duke of Wellington (gr. Mr. Matthews), for vegetables. (Class 54.)

To His Grace The Duke of Wellington (gr. Mr. Matthews), for vegetables. (Class 53.)

The Southampton Gas Light & Coke Co., for an educational exhibit of preserved fruits.

Silver Banksian.

To Mr. F. M. Vokes, for vegetables. (Class 1.)
To Mr. H. Broom, for vegetables. (Class 1.)
To Mr. H. Broom, for vegetables. (Class 54.)
To W. H. Myers, Esq. (gr. Mr. Ellwood), for Grapes. (Class 60.)
To W. H. Myers, Esq. (gr. Mr. Ellwood), for fruit. (Class 60.)
To The Lady Swaythling (gr. Mr. Hall), for fruit. (Class 60.)

Bronze Banksian.

To His Grace The Duke of Wellington (gr. Mr. Matthews), for Kitchen Apples.
To Mr. James Enticott, for vegetables. (Class 14.)
To Mr. S. T. White, for vegetables. (Class 36.)
To Mr. H. Broom, for vegetables. (Class 36.)
To W. H. Myers, Esq. (gr. Mr. Ellwood), for onions.
To Mr. W. Smith, for vegetables. (Class 3.)
To Mr. S. T. White, for vegetables. (Class 2.)
To Mr. S. T. White, for vegetables. (Class 1.)
To Mr. J. Liddell (gr. Mr. Learworth), for Kitchen Apples.
To Mr. W. Smith, for Kidney Potatos.

GENERAL MEETING.

OCTOBER 22, 1918.

The Rt. Hon. Lord LAMBOURNE in the Chair.

Fellows elected (31).—R. H. Bruce, C. E. Buck, A. H. Crook, G. W. Cull, W. A. Evans, Mrs. E. M. Fancourt, Hon. Mrs. Franklin, E. H. Freeman, Mrs. R. Hirst, Miss D. R. Jones, H. R. Lash, J. Leacy, A. E. Marlow, Mrs. Morse, John Osborne, W. R. Price, H. W. Randall, Sir H. Rendall, W. H. Rogers, H. Savill, Allen Silver, Col. H. M. Sinclair, Mrs. R. B. Smith, L. Snowdon, N. G. Tidy, A. M. Tombleson, C. Watts, C. C. Wigg, A. Woodhead, Sergt. C. Woods, H. Wright.

Associate (1).—E. Ashcroft.

Affiliated Societies (9).—Borough of Wandsworth Horticultural Society, Bristol Gardeners' Club Allotment Society, Caerleon Allotments and Garden

Association, Cunard Horticultural Society, Erdington and District Allotment Association, Frindsbury Food Production Society, Great Central Railway Leicester Garden Society, Greater Vancouver Horticultural Society, Pontnewydd and District Allotment Association.

Mr. A.W. Sutton, F.L.S., V.M.H., gave a lecture on "Summer-sown Vegetables as Secondary Crops" (see p. 13).

GENERAL MEETING.

November 5, 1918.

Rev. W. Wilks, M.A., V.M.H., in the Chair.

Fellows elected (16).—J. Andrew, Miss E. Cowen, J. H. Crockett, W. R. Elgar, E. L. Ellis, W. B. Mullett, G. H. Parkin, F. W. Peoples, R. T. Rands, T. Rice, Mrs. C. M. Solomon, J. B. Steveson, W. Walker, W. Wastell, Miss A. B. Webb, F. J. Wickham.

Fellows resident abroad (2).—Her Highness Princess Eugene Murat, S. L. Patel.

Associates (2).—J. Adamson, C. F. Coates.

Affiliated Societies (4).—Briton Ferry Horticultural Society, Broadway and Stoneleigh Road Allotment Association, Long Lane Woodside Allotment Holders' Association, Rowsley and District Cottage Garden Association.

Dr. F. Stokes gave a lecture on "The Food Values of Vegetables" (see p. 21).

GENERAL MEETING.

November 19, 1918.

Mr. A. C. Bartlett in the Chair.

Fellows elected (27).—G. Ball, Miss M. Bidgood, Mrs. Bidgood, J. G. Capon, Rev. H. A. Cumberlege, W. M. Elkington, Lady Evelyn Ewart, F. E. Foster, Mrs. E. Gillespie, Capt. R. H. Grey, W. A. Jepps, W. Lappage, F. Lawson, Capt. W. R. Penrose, W. Powell, G. Richings, Mrs. W. Runciman, E. J. Ryall, W. H. P. Stevens, Mrs. A. Strickland, A. Talaat, W. A. Taylor, J. P. Tilley, G. F. Tinley, Lieut. H. Tozer, A. V. Whittington, L. Wright.

Fellows resident abroad (1).—Lala A. R. Sareen.

Associate (1).—Miss E. Hibberdine.

Affiliated Society (1).—Risca Central Ward Allotment Holders' Association.

Mr. H. E. P. Hodsoll gave a lecture on "The Care of Soils."

GENERAL MEETING.

December 3, 1918.

Field-Marshal the Rt. Hon. Lord Grenfell in the Chair.

Fellows elected (24).—Miss M. Alcock, A. T. Harrison, Major-Gen. F. C. Heath-Caldwell, H. G. Hill, J. Hodson, J. W. Huxley, S. Johns, S. F. Lewin, Mrs. Macgowan, F. J. Miller, G. H. Mytton, H. E. O'Brien, W. J. Prowting, Sir Marshall Reid, Miss V. Rosencrantz, G. A. Short, F. R. Shortis, Miss M. C. Stead, T. Walsh, H. M. Warbrick, E. Wardley, R. Warmer, E. G. Whitehead, A. du Baree Wilson.

Associate (1).—G. Ball.

Affiliated Societies (2).—Hykeham Rural Society, Melton Mowbray Allotment Holders' Association.

The Lawrence Medal was awarded to Messrs. Sutton for the excellent quality and great educational value of their frequent exhibits of summer-sown vegetables.

Société Nationale d'Horticulture de France,
84, Rue de Grenelle, Paris.
Le 20 *novembre*, 1918.

Monsieur le Président,—Au moment où la victoire vient de récompenser les efforts des nations alliées pour la défense du droit et de la liberté, la Société Nationale d'Horticulture de France tient à envoyer à la Société Royale d'Horticulture de Londres l'expression de ses plus vifs et plus sincères sentiments d'amitié.

Si, pendant la guerre, nous avons pu voir les soldats de nos deux pays, combattre étroitement unis pour le triomphe de la même cause, notre action commune tendra, pendant la paix, à resserrer les liens de bonne confraternité qui existent déjà, de si longue date, entre horticulteurs anglais et français.

Veuillez agréer, Monsieur le Président, l'assurance de nos sentiments les plus distingués,

Le Président,
VIGER, *Sénateur.*

Le 1e Vice-Président.
CHATENAY ABEL.

ROYAL HORTICULTURAL SOCIETY.
VINCENT SQUARE,
WESTMINSTER, S.W.
December 3, 1918.

MONSIEUR LE PRÉSIDENT VIGER ET MONSIEUR LE 1E VICE-PRÉSIDENT ABEL CHATENAY, Société Nationale d'Horticulture de France,—Your most welcome expression of the deepest and most sincere feeling of friendship towards our Society is most heartily reciprocated by us towards the Société Nationale de France, as well as to all your compatriots.

The brave sailors and soldiers and airmen of our Allied Nations have kept watch and guard and have fought side by side for four most strenuous years, and now we hope that the Naval and Military Alliance which has been thus instrumental in restoring to your country the provinces so ruthlessly torn from you in the former war may be succeeded by a perpetually enduring alliance between France and Great Britain in the pursuit of all good projects for the welfare, peace, and concord of all mankind and especially (as behoves our two Societies) for the advance and improvement of Horticulture in all its manifold directions.

Thanking you sincerely for your fraternal letter of congratulation at the prospect of a speedy peace,

We are, Gentlemen,

GRENFELL. *Field Marshal,*
President.

HARRY J. VEITCH,
Treasurer.

Countersigned : W. WILKS, *Secretary.*

SCIENTIFIC COMMITTEE.

JANUARY 15, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and seven members present.

Town refuse as manure.—Mr. F. J. Chittenden, V.M.H., said he had secured an analysis of a sample of town refuse similar in appearance to that shown by Mr. J. Hudson, V.M.H., at the last meeting, which showed a high content of lime, about 2 per cent. phosphate, and 1½ per cent. nitrogen. Mr. J. W. Odell said he had also an analysis, and his showed a lower percentage of all these manurial substances than the one referred to. Experiments are being made at Wisley, Rothamsted, and Long Ashton to ascertain its manurial value.

Variation in shade of French Beans.—Mr. J. Fraser, F.L.S., showed seeds of the variety 'Mont d'Or,' remarking upon the difference in shade of seeds of the same harvest. This difference is common in French Beans, and appears to be the result of differences in ripeness and of weather effect rather than of a constitutional character.

Oil-bearing seeds for cultivation in England.—At the instance of Dr. F. Keeble, F.R.S., a discussion took place upon the kinds of plants which might be grown for their oil in England. They appear to be few, and none seems to produce a palatable oil. The oil-bearing Flax, Rape, and other species of Brassicas, Sunflowers, Coreopsis, with perhaps some Malvaceous plants such as Malope and Lavatera, seem practically the only ones which are likely to succeed as oil-producing plants in this country.

SCIENTIFIC COMMITTEE, JANUARY 29, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and five members present.

Potato Reproduction.—Mr. J. S. Arkwright, D.L., showed a Potato of the 1916 crop, which, remaining unplanted, had continued to throw out shoots and produce small tubers. The tubers were successively absorbed and shrivelled as new ones were produced. The formation of young tubers from pith cells inside the old tuber, when the development of shoots is entirely suppressed, was referred to by Mr. W. C. Worsdell.

Hybrid Galanthus.—Mr. Bowles showed a number of seedlings raised by Mr. F. H. Chapman, of Rye, apparently the result of crossing *Galanthus Elwesii* with *G. Fosteri*, and showing characters of both parents in the foliage and to some extent in the flowers.

SCIENTIFIC COMMITTEE, FEBRUARY 12, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and eight members present.

Abnormal Damson-stone.—Mr. Bowles showed a stone of a Damson having four instead of two edges, which Mr. W. C. Worsdell, F.L.S., took for further examination.

Eelworm in Gardenia Roots.—Mr. J. Fraser, F.L.S., showed specimens of Gardenia roots with galls upon them produced by the root-knot eelworm, *Heterodera radicicola*.

Food Value of Fruits.—A discussion took place on the relative food values of common fruits. The Grape has a very high food value, and the Apple also stands very high in this respect.

SCIENTIFIC COMMITTEE, FEBRUARY 26, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, with twelve members present, and Misses I. B. Sutton, C. Pellew, visitors.

Mr. S. U. Pickering, M.A., F.R.S., read a paper on "The Action of one Crop upon another," and some discussion took place (see vol. xlii. p. 372).

Scientific Committee, March 12, 1918.

Mr. E. A. Bowles, M.A., V.M.H., F.L.S., in the Chair, and six members present.

Curious fruit from Palestine.—Mr. W. C. Worsdell, F.L.S., said he had ascertained at Kew that the fruit which Mr. Bowles showed at a previous meeting was that of a species of *Astragalus* near *A. macrocarpus*. It was peculiar in the rattling noise made by the ripe capsules.

Mahonia with partially bipinnate leaf.—Mr. Bowles showed a leaf of *Mahonia Aquifolium* from his garden in which one of the leaflets had developed in a pinnately compound form with three leaflets.

An early-flowering Wood Anemone.—He also showed an early flowering form of *Anemone nemorosa*, possibly the variety *quinquefolia*, which always opened its flowers in February.

Potato tubers diseased.—Potato tubers showing black discolorations in the flesh from which a somewhat viscous black fluid was exuding came from Cambridge and Sunderland. This black decay is probably the result of an attack by a bacterium belonging to the *Bacillus melanogenes* group, and possibly that which produces the disease called "black-leg" which was somewhat prevalent last year.

Scientific Committee, March 26, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and four members present.

Plants from Salonika.—Mr. Bowles showed flowering specimens of a white form of *Romulea Bulbocodium*, with buff shaded exteriors to the outer perianth pieces, and *Ornithogalum divergens*, both raised from bulbs sent from Salonika.

Seed from W. Indies.—Mr. W. C. Worsdell, F.L.S., said he had compared a seed brought by Mr. W. Hales, A.L.S., to the last meeting with specimens in the Kew Herbarium, and found it to belong to the genus *Dioclea*. The plants of this genus are widely spread through the tropics, and the seed floats long in the sea, being frequently washed up upon the shores of tropical seas.

Persistent fungus.—Mr. Worsdell also said that the fungus shown at the last meeting from the Rev. W. Wilks was *Russula nigricans*. Every year this fungus growing in Mr. Wilks' wood at Shirley dried up and turned black in autumn, and persisted in this condition for a long time.

Polyembryonic acorns.—Mr. Hales showed an acorn, one of many similar ones, in which three complete embryos had developed and given rise to three plants on germination. Others of the same batch of seeds from Sussex produced two and a few one plant.

Potato Scab.—Some specimens of the common Potato scab were shown. This disease, which is only skin deep, and does not appear to affect the weight of crop adversely, is due to the attack of a bacterium called *Actinomyces chromogenus* (formerly known as *Oospora scabies*). It is spread by infection from old tubers for the most part, and this may be obviated in a great measure by steeping the affected tubers before they are boxed for sprouting in a solution of one part of formalin to two hundred of water.

Scientific Committee, April 9, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and five members present.

Branched Catkins.—Mr. J. Fraser, F.L.S., showed a branched catkin of *Populus serotina*. He remarked that the staminate catkins of this form usually drop without shedding their pollen.

A compound catkin (♂) of hazel with branches at both ends was shown from the Ridgmont Experimental Station, where it had been noticed by Mr. Nield.

Oxalic acid in Sesame cake.—Dr. J. A. Voelcker, M.A., drew attention to the presence of oxalic acid in some samples of Sesame cake which had recently come to him for analysis; the amount appears to vary in different samples, and to be absent from many. It is difficult to see how the presence of oxalic acid is to be accounted for, but it may be due to the use for the cake-making of immature Sesame seed.

Scientific Committee, April 23, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and seven members present.

Sternbergia from Salonika.—Mr. Bowles showed a *Sternbergia* from Salonika which appeared to be nearest to *S. lutea β*.

Various plants.—Mr. H. J. Elwes, F.R.S., remarked upon the great vigour of a pinkish-blue *Anemone Hepatica triloba* form which he had received under the name *Pauli*, and upon the fashion in which *Lilium roseum* develops and flowers under protection, in five-inch pots, provided the foliage is well developed.

Scientific Committee, May 7, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and seven members present.

Potato Seedlings.—The interesting and comprehensive exhibit of seedling potatos of the 'Castle' strain, shown by Messrs. Sutton, was referred to, and the award of a Certificate of Appreciation to Messrs. Sutton unanimously recommended, on the motion of Dr. W. Bateson, F.R.S., seconded by Mr. W. Hales, A.L.S.

Willow Gall.—Mr. J. Fraser, F.L.S., showed young stages of the tassel gall of the Willow, older stages of which have frequently been before the Committee. He found the staminate flowers of *Salix alba* had been converted into pistillate form by the attack.

Onion Seedlings Destroyed.—Dr. A. B. Rendle, F.R.S., drew attention to the damaging effect of a proprietary substance sold for killing worms, upon seedling Onions, as a warning against the use of unknown substances for the suppression of pests.

Abnormal Orchids.—Mr. Bowles showed an *Odontoglossum* with two flowers synanthic, and a *Laelia* with an abortive labellum.

Narcissus poeticus verus.—He also showed flowers of Linnaeus' form of *Narcissus poeticus*, a small-flowered form, and one of the parents of 'Crimson Braid.'

Various Plants.—Mr. H. J. Elwes, F.R.S., showed an inflorescence of a *Cypripedium*, perhaps *C. grande*; *Iris Hoogeana*, and some of the Regelio-cyclus Irises; a very early-flowered *Uvaria*—perhaps *U. aloides praecox*; *Moraea spathacea*, which proved quite hardy in 1917, while the closely allied *M. Huttonii* is always killed in winter; *Iris Wattii* with inflorescences 6 feet tall, from a cold greenhouse, a close relation of *I. fimbriata*; a *Trillium* which succeeds remarkably well, seeding everywhere at Colesborne, and known there as *T. stylosum album*; *Fritillaria acmopetala*, and the forms known as *Elwesii* and *Whittallii*, *F. lutea* and *F. armena*; *Muscaria paradoxum* and *Bellevalia romana*.

Scientific Committee, May 28, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and seven members present.

Ornithogalum refractum.—Mr. W. C. Worsdell, F.L.S., reported that he had examined the *Ornithogalum* from Salonika shown at a recent meeting by Mr. Bowles, and had come to the conclusion that it was *O. refractum*.

'Thorn' Apple.—Mr. Worsdell showed flowers of the curious Apple called 'Thorn' Apple shown some time ago from Over Wallop. The flowers had all the petals and stamens converted into sepals, the "fruit" being formed of the fleshy bases of the latter. The ovary was apparently normal.

Paeony from Salonika.—Mr. Bowles showed a flower of a dark wine-red form of *Paeonia officinalis* from a plant collected in Salonika.

Primrose with foliose corolla.—Mr. Bowles also showed a Primrose with a corolla with green petals and midrib and veining of ordinary leaves. The form came originally from Messrs. Cocker, of Aberdeen. The calyx was more or less dialysed.

Scientific Committee, June 18, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and six members present.

The late Mr. R. Hooper Pearson.—The Chairman referred to the loss the Committee had sustained by the death of Mr. R. Hooper Pearson, whose wide knowledge and sound judgment had been of great value to the Committee. The

Committee unanimously desired that their sincere condolences be sent to Mrs. Pearson and her daughter.

The Committee's Jubilee.—Mr. Bowles referred to the fact that fifty years had now elapsed since the formation of the Scientific Committee, the first meeting of which was held on April 20, 1868, and he brought a message of congratulation and thanks from the Council for the work done in the past, and their good wishes for the future. Of the original Committee only one member, Mr. J. G. Baker, F.R.S., remains alive.

Aberrant Habenaria.—Dr. A. B. Rendle, F.R.S., reported upon a plant of *Habenaria chlorantha* collected by Mr. Percy Bunyard at Woldingham as follows: In the flowers sent the peculiarity is the multiplication of the fertile anthers. A number of pairs of pollen sacs are produced on the column successively inside the normal one. These all contain pollen, even the smallest ones having a few grains.

Silver Leaf in Apple.—Sir Harry Veitch, F.L.S., sent branches of Apple 'Newton Wonder' from East Burnham Park, the entire foliage of which showed the silvery appearance characteristic of the attack of *Stereum purpureum.*

Double Potentilla reptans.—Mrs. Colville sent a plant of *Potentilla reptans* with double flowers which she had found growing wild in Oxfordshire. Mr. Allard mentioned the occurrence of another double plant of the same species at Southwold.

Pollination of Mistletoe.—Mr. Bowles referred to the absence of knowledge concerning the flies which pollinate Mistletoe, and said that he had captured several species at the flowers which had not all yet been named. Diptera appear to be the chief agents.

Change of Colour at Base of Tulip.—A letter drawing attention to a change in the colour of the base of the Tulip 'Eclipse' was read from Messrs. Barr. When shown last year, the base of those grown under glass was much less defined than in those grown in the open, and the Tulips were considered distinct. This year, when bulbs from the two sources were grown side by side, the bases in both were alike, thus showing that the basal colour is not invariable, or independent of external conditions.

Lily from Salonika.—Mr. Bowles showed flowers of a very dark form of *Lilium Martagon* from Salonika, not of so dark a colour, however, as *dalmaticum.*

Mint.—Shoots of a Mint were sent from the Devon Medical Herb Industry. Plants were grown last year as *Mentha viridis*, some were transplanted, and this year shoots with very hairy foliage had appeared. Mr. J. Fraser, F.L.S., recognized the shoots as those of *Mentha sylvestris.*

Scientific Committee, July 2, 1918.

Mr. E. A Bowles, M.A., V.M.H., in the Chair, and ten members present.

Poppy Roots invaded by Grubs.—Mr. J. Fraser, F.L.S., showed roots of *Papaver orientalis* invaded by the larvae of a burrowing beetle, probably a species of *Otiorrhynchus*, which had caused the death of the plants. Eelworms were also present, but they were of a non-parasitic nature.

Coloration of Leaves.—Col. Rawson showed leaves of Virginia Creeper brilliantly coloured at the edges where sunlight had passed other leaves and fallen upon them. He also showed a Poppy of the 'Mikado' type which had appeared in his garden apparently from seed of the common white form of the opium Poppy. This change he attributed to the incidence of certain rays of light.

Caterpillar Attack on Aconite.—Mr. J. W. Odell showed the cocoons of the moth *Plusia moneta*, which attacks Aconite. The insect was apparently introduced about fifteen years ago, and has spread widely since.

Thalictrum Chelidonii.—Mr. E. J. Allard showed a plant of *Thalictrum Chelidonii*, a large-flowered species from Asia, not at all common in gardens.

Various Plants.—Mr. Bowles showed plants of *Lilium candidum* from Salonika with more leathery leaves than is common, and more crateriform flowers. He also showed *Centranthus angustifolius* which he had collected at Modane, and a hybrid between it and *C. ruber.*

Insects on Mistletoe Flowers.—Dr. A. B. Rendle, F.R.S., brought a list of insects caught by Mr. Bowles on Mistletoe flowers this spring. The insects, as determined by Mr. K. G. Blair, were as follows: Diptera: *Simulium reptans*, 2 ♂; *Musca corvina*, ♂; *Scatophaga stercoraria*, 2 ♂, 3 ♀; *Limnophora septemnotata*, 1 ♂, 4 ♀; *Leptis nigripes*, 2 ♂; *Chloropisca notata*, 4; *Phora*, sp. 2; Hymenoptera: *Ichneumonidae*, 1; Rhynchota: *Capsidae*, 1.

Scientific Committee, July 16, 1918

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and seven members present.

Abundance of Poppies.—Dr. J. A. Voelcker, M.A., drew attention to the remarkable abundance of the common field Poppy in Wheat fields this season, and especially upon a plot in the Woburn Experimental Farm where Wheat following Tares fed off with sheep was a poor plant, while Poppies were abundant ; on the adjoining plot where the treatment was the same except that Mustard had been fed off instead of Tares, the Wheat was a good crop and Poppies practically absent.

Seakale attacked by Gall Weevil.—Mr. J. Fraser, F.L.S., showed a specimen of Seakale stem with a chain of galls several inches long, produced by the gall weevil (*Ceutorrhynchus* sp.). These galls are usually found only at the ground level.

Doubling of Various Flowers, etc.—Col. H. E. Rawson exhibited further specimens of Poppy flowers showing colour and form changes which had arisen in his garden, and which he attributed to exposure to certain light rays. He called attention to the change of stamens into petals in the doubling of the Poppy, and to the presence of inverted spurs in double Aquilegias and Tropaeolums from his garden.

Reversion in Cauliflower.—Mr. W. C. Worsdell, F.L.S., showed a developing inflorescence of Cauliflower in which the group was composed, not as is usual of a mass of hypertrophied flower-stems, but of thousands of flower-buds with a few leafy bracts among them.

Disappearance of the Bee Orchis.—Mr. H. J. Elwes, F.R.S., remarked upon the scarcity of information regarding the life histories of British Orchids, and gave an instance of the remarkable appearance of flowering plants of Bee Orchids last year in a wood cleared four years before, whereas this season none is to be found.

Proliferation in Echeveria setosa.—Mr. W. E. Ledger showed a plant of *Echeveria setosa* from his garden in which the flowering axis in one case bore a rosette of leaves at its tip without flowers, while in another a flowering shoot sprang from just beneath the rosette.

Curled Mustard.—Mr. A. Ireland sent a plant of the Chinese Curled Mustard, which he said he had found to make an excellent salad, and very good food for rabbits. The plant he had found as a weed in waste places : it is easily raised from seed sown in April.

Tall Antirrhinum.—From Mrs. Wilson, of Merstham, Surrey, came an account of an Antirrhinum which had attained the height of 64 inches. This was apparently a further instance of the appearance of a giant race of these plants, such as has previously been brought before the Committee, and would doubtless breed true if self-fertilized.

Spiral torsion in Valerian, etc.—Mr. E. M. Holmes, F.L.S., sent a remarkable specimen of *Valeriana officinalis* with fasciated and spirally twisted stem, about an inch in breadth. He also sent a specimen of the inflorescence of *Angelica sylvatica* with numerous leafy bracts among the flowers.

Cultivated Spurrey.—Some discussion took place regarding the Spurrey grown on the Continent for feeding sheep. It is sometimes distinguished by agriculturists from *Spergula arvensis* under the name of *S. maxima*, but is usually regarded as a form, scarcely meriting a varietal name, of that species.

Scientific Committee, July 30, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and seven members present.

Spiral torsion in Nettle.—Mr. Bowles showed a case of spiral torsion in the stem of the common nettle (*Urtica dioica*), from Sir Hugh Beevor's garden at Hargham.

The 'Thorn' Apple.—Mr. W. C. Worsdell, F.L.S., showed further examples of the so-called Thorn Apple from Dorsetshire, demonstrating the change of both stamens and petals into fleshy structures in the formation of the fruits, which externally show only the edges of these structures. The tree constantly produces these curious malformed fruits.

Fasciated Vegetable Marrow.—Mr. J. W. Odell showed an example of fasciation in Vegetable Marrow in which three flowers took part. They were all staminate.

Fruit of Chimonanthus fragrans.—Mr. J. Fraser, F.L.S., showed a fruit of the 'Winter Sweet' ripened in this country.

Various Plants.—Mr. Hay sent specimens of the following uncommon plants: *Antirrhinum Coulterianum* and *Lupinus Grayi*, from California; *Saxifraga fimbriata*, from the Himalaya; a deep-coloured form of *Impatiens Roylei*; *Meconopsis latifolia* with incipient doubling.

Scientific Committee, August 13, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and seven members present.

Trigonella coerulea.—Mr. J. Fraser, F.L.S., showed a specimen of this plant, which has a very persistent odour somewhat like that of curry. It is a native of Southern Tyrol and Italy, and is said to be used for giving scent to cheese and for spicing cattle cake.

Doubling of Tropaeolum.—Col. H. E. Rawson showed some examples of *Tropaeolum* with enations from the calyx adjacent to the spur, where petaloid growths had been produced bearing an anther (or part of one) on their margins. He considered that this might be the beginning of the doubling of the flower. Mr. E. J. Allard pointed out that there were two forms of double Tropaeolums arising from different kinds of multiplication of parts.

Plants from Palestine.—Mr. J. W. Odell showed examples of *Marrubium vulgare*, *Verbascum Blattaria*, and a species of *Nigella* raised from seed sent from Palestine. The last was not recognized, and Dr. Rendle took it for further examination.

Rubus sp.—Mr. Bowles showed a species of *Rubus*, a chance seedling in his garden, and probably of Chinese origin, with palmate leaves, white tomentose beneath, and drooping clusters of large black fruits. Dr. Rendle also took this for further examination.

Damage by Hail.—The Rev. W. Wilks showed a specimen of *Vitis* with the foliage perforated by hailstones in a recent storm at Shirley, and the stem with large warts resulting from damage from the same agency.

Scientific Committee, August 27, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and three members present.

Atropa Belladonna.—Leaves were sent by the Leinster Herb Association showing perforation, these were referred to Mr. A. D. Cotton.

Apple Rot.—Fruit sent by Mrs. J. D. Crosfield showed *Sclerotium pyrinum* in various stages.

A Certificate of Appreciation was unanimously recommended to Mr. C. J. Lucas of Warnham Court for his work in raising *Odontoglossum* × 'Joy' (*Uro-Skinneri* × *eximium*).

Scientific Committee, September 10, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and four members present.

Perforated leaves of Atropa.—Mr. A. D. Cotton, F.L.S., reported that he found no fungus on the leaves referred to him, but considered the trouble was probably due to a biting insect which search would most likely reveal.

Potato Wart Disease (*Synchytrium endobioticum*).—Mr. F. J. Frogbrook attended and exhibited Potatos affected with wart disease. It was pointed out by the Committee that the disease was notifiable, and every effort should be made to destroy the affected tubers on the Leyton Allotments, where the outbreak had occurred.

Fasciated Maize.—Mr. A. T. Johnson exhibited a spike of Maize showing fasciation with male and female parts reversed. A similar exhibit also came from Mr. J. Fraser.

Pseudolarix Kaempferi.—A fruiting branch of this Larch, taken from the original imported plant, was sent by Mr. G. Paul. The specimen was well covered with small, green, Artichoke-like cones.

Lycium chinense.—Mr. J. W. Odell showed a branch of this Chinese Box Thorn bearing numbers of coral fruits. It was grown in the London area, and was considered by the Committee to be the variety *megistocarpum*.

Potato Scab.—Mr. H. P. Betts showed tubers with this disease.

Malformed Potatos.—Tubers showing malformation were sent by Mr. Cheal and the R.H.S. Gardens, Wisley.

Potatos and drought.—Mr. J. Fraser, F.L.S., showed tubers misshapen by the hard condition of the ground during the early summer drought.

Scientific Committee, September 24, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and five members present.

Primula japonica proliferous.—Mr. F. J. Chittenden, V.M.H., showed a plant of *Primula japonica* from Wisley in which the flower scape bore a leaf about 2 inches above its origin and in its axil a well-developed plant, so that the resulting growth appeared almost like a runner from the old plant.

Aberrant Maize.—Mr. H. Cowley sent a portion of a staminate inflorescence of Maize the main branch of which bore at its apex several pistillate flowers in a group.

Helenium autumnale.—Mr. Wood, of Ashtead, sent inflorescences of *Helenium autumnale* virescent and with numerous lateral proliferations which usually accompany virescence in this plant. Similar growths have been figured in the Society's Journal.

Scientific Committee, October 8, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and one member present.

Rhododendron neriiflorum.—Mr. E. Magor, Lamellen, St. Tudy, Cornwall, sent flowers of the beautiful deep red *Rhododendron neriiflorum*, raised by him from seed collected by Mr. G. Forrest. The plant flowers in April, and again in October as a rule.

Hybrid Buddleia.—Mr. W. van de Weyer, of Smedmore House, Corfe Castle, Dorset, sent flowering shoots of an interesting hybrid—*Buddleia globosa* ♀ × *B. magnifica* ♂. The flowers were in racemes of globose heads, purple in the bud, yellow to orange as they open, and very sweetly scented. The following note upon them accompanied the specimens: "I am sending herewith some late flower trusses of some hybrid seedlings of *Buddleia* I have raised. They are, I think, interesting, as they are *B. globosa* (female parent) × *B. magnifica* (male parent). Some are the second generation of this cross (selfed). The second generation show no difference from the first. One gets just the same variations. The curious thing to me is the large percentage of pale-coloured seedlings one gets, and I have not yet got an orange one. They all show *B. magnifica* leaves (except two, which have not yet flowered), and all flower at the same time as, or later than, *B. magnifica*, none flowering at the time of *B. globosa*. All are scented. I have also some crosses between *Buddleia globosa* (female parent) × *Buddleia madagascariensis* (male parent). These hybrids are not quite hardy. They flower very early, before *B. globosa*. All show the leaves of *B. globosa*, only as large as *B. madagascariensis*. All have large, orange ball trusses like *B. globosa*, only the balls are larger, and none that has flowered so far is scented. I might add *B. globosa* × *B. magnifica* sets seed freely naturally. *B. globosa* × *B. madagascariensis* does not do so; in fact, has never set a seed naturally, and I have been away in France, so have never pollinated the flowers by hand."

Scientific Committee, October 22, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and eight members present.

Certificate of Appreciation.—The Committee unanimously recommended a certificate of appreciation to Mr. W. van de Weyer for his work in raising hybrid *Buddleia globosa* × *magnifica*.

Phyllanthus sp.—Mr. W. Fawcett, B.Sc., showed an interesting series of herbarium specimens to illustrate the different degrees of specialization of shoots in *Phyllanthus*. In *P. epiphyllanthus* the flower-bearing branches are modified to a leaf-like form and spirally arranged. In *P. montanus* they are similarly modified and arranged in two rows on the penultimate branches. In *P. speciosus* the flowering branches are distichous and the penultimate branches are themselves flattened, and *P. isolepis* is similar; the whole penultimate branch is deciduous. In *P. linearis* the modification is carried still further.

Broom with curved branches.—Mr. J. W. Odell showed shoots of *Cytisus praecox* with their ultimate branchlets curved instead of straight. This occurred in many plants near Bournemouth and not only on the branches arching over but also on those growing erect.

SCIENTIFIC COMMITTEE, NOVEMBER 5, 1918.

Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and four members present.

The late Mr. E. J. Allard.—The Committee heard with sincere regret of the death of this member Mr. E. J. Allard and unanimously passed a vote of condolence with Mrs. Allard, which the Secretary was instructed to send.

Crinum longifolium ?—Mr. Thomas Sharp of Westbury, Wilts, sent a leaf of *Crinum* measuring 12 feet 6 inches in length from a plant in his possession. The bulb came to him in 1915, it gave one peduncle in 1916, two in 1917 and two in 1918, one being 2 feet in height, the other 3 feet. The bulb now measures 17 inches in circumference at the ground level. Two seedlings have been raised. It is thought that the plant may possibly be *Crinum longifolium* var. *Farinianum.*

Fasciation in Tropaeolum tuberosum.—Col. H. E. Rawson exhibited a flattened stem *Tropaeolum tuberosum* "which had been screened at selected intervals of daylight. The stem was two inches wide at its apex." He said, "I attribute the fasciation to the incidence of a maximum of blue light on the plant, and this was due to the screening. An unscreened control plant showed no sign of fasciation."

Soya beans.—Mr. W. Hales, A.L.S., showed a plant of Soya bean from the Chelsea Physic Garden bearing a large number of ripe pods. Mr. Chittenden said that in poor sandy soil at Wisley the plants had ripened seed, but had not produced nearly so many as were present on that shown by Mr. Hales.

Wheat-ear in Heath.—Mr. W. C. Worsdell, F.L.S., showed a specimen of the Cornish Heath (*Erica vagans*) showing the "wheat-ear" condition and very showy in consequence.

Proliferation in Lupines.—He also showed a lupine exhibiting the common phenomenon of proliferation, in this case axial.

Lilium candidum fruiting.—Mr. Bowles showed fruits of a *Lilium candidum* from Salonika ripened in his garden at Enfield.

Potato seed tubers.—Mr. H. W. Atkinson of Eastbury Avenue, Northwood, sent some seed potatos with the following note:—"I am sending some seed potatos that have stood boxed since the spring and were not required for setting for my crop.

"The interesting point about them is the way in which they have sent out not only shoots and roots but have also formed tubers.

"You will see from the samples sent that they differ very greatly in the number of tubers borne, and it would appear that the tubers formed thus in the boxes would indicate how much crop would have been produced from each root had they been planted. As they are from a single small box the conditions in the box cannot have affected the individual sets differently.

"From these examples it would seem that the crop that a set will produce is dependent on the precise nature and condition of the set rather than on the conditions it will meet with in the ground.

"These sets were from a supply obtained from our local District Council and said to be Scotch seed.

"Have you any knowledge of any means of detecting the character of sets before they are planted? For instance, should they be firm or rather flabby? There is a theory, I have read, that somewhat immature tubers are considered best for seed, but I am not aware whether this is a theory only or proved by careful tests.

"From the results of this experiment of mine it would seem that there is a field of research open that might lead to very valuable results from an economic point of view."

The results of experiments with potatos in Society's gardens at Wisley leave no doubt that the crop-yielding capacity of potato-tubers is, to a certain extent, fixed before the tubers are planted and is, to a certain extent, an individual character. In no other way can the differences in individual yields be accounted for.

Banksia serrata.—Mr. W. McGowan, Superintendent of the Public Reserves, Launceston, Tasmania, sent an inflorescence and foliage of the curious Proteaceous plant, *Banksia serrata.*

Scientific Committee, November 19, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and three members present.

Iris leaves attacked by Dipteron.—Mr. J. Fraser showed some flies hatched out from leaves of *Iris foetidissima* burrowed in the same fashion as those shown by Mr. Bowles last year. Mr. Bowles said that several species of *Iris* with evergreen leaves were being attacked and disfigured in his garden. The fly hatches out some time between March and July, the earlier date being given by Professor F. V. Theobald, and the later being the one which Mr. Fraser had observed. It pupates in late autumn in the leaves. Two species have been associated with this trouble, but Mr. Collin of the Pathological Laboratory, Kew, considers they may be merely two names for the same thing, *Agromyza iraeos.*

Sensitiveness of potato plants to exposure.—Mr. F. J. Chittenden referred to the extraordinary sensitiveness of potato plants to full exposure or to less exposure to light, &c., as revealed by the weights obtained from plants in different positions in the experimental plots at Wisley, a fuller account of which is published elsewhere (see p. 72).

Scientific Committee, December 3, 1918.

Mr. E. A. Bowles, M.A., V.M.H., in the Chair, and five members present.

Seedlings of Ceratonia.—Mr. J. Fraser, F.L.S., showed seeds and seedlings of *Ceratonia Siliqua* which he had found on Kew Green. The seedlings have hypogeal cotyledons.

FRUIT AND VEGETABLE COMMITTEE.

JANUARY 15, 1918.

Mr. W. POUPART in the Chair, and thirteen members present.

Award Recommended :—

Award of Merit.

To Apple ' St. Cecilia ' (votes 12 for, 2 against), from Mr. J. Basham, Bassaleg. Fruit of medium size, of perfect shape, inclined to be conical ; skin green covered with short red stripes on the exposed side and flushed with red ; eye closed ; segments incurved, set in a narrow puckered basin ; stalk very thin, ¾ inch long, rather deeply inserted in a small funnel ; flesh very crisp and of good flavour, somewhat resembling that of one of its parents, viz. ' Cox's Orange Pippin.' The other parent is unknown. The tree is said to be rather like ' Cox's Orange Pippin ' in wood and foliage. It is a healthy grower and a free bearer. (Fig. 36.)

Other Exhibits.

R.H.S. Gardens, Wisley : Haricot Beans.
Mr. T. Challis, V.M.H., Wilton : seedling Apple.

FRUIT AND VEGETABLE COMMITTEE, JANUARY 29, 1918.

Mr. W. POUPART in the Chair, and eight members present.

No awards were recommended on this occasion.

Exhibits.

Mr. W. M. Coxall, Haslingfield : seedling Apple.
Mr. A. Dawkins, Chelsea : Onion ' Autumn Triumph.'
Messrs. Laxton, Bedford : seedling Apples.
R.H.S. Gardens, Wisley : collection of Onions.
Messrs. Waterer, Sons & Crisp, Bagshot : Apple ' Park Royal.'

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 12, 1918.

Mr. J. CHEAL, V.M.H., in the Chair, and fifteen members present.

Award Recommended :—

Silver Knightian Medal.

To Messrs. Sutton, Reading, for vegetables.

Other Exhibits.

Sir Everard Hambro, Blandford : seedling Apples.
Mr. J. Udale, Droitwich : seedling Apples.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 19, 1918.

SUB-COMMITTEE AT WISLEY.

Mr. J. HUDSON, V.M.H., in the Chair, and three members present.

A Sub-Committee inspected the Trial of Leeks and made the following recommendations for awards :—

Award of Merit.

No. 18, ' Champion ' sent by Messrs. Dobbie ; No. 16, ' International Prize,' sent by Messrs. Dobbie ; No. 25, ' Prizetaker,' sent by Messrs. Sutton ; No. 10, ' Royal Favourite,' sent by Messrs. Sutton.

Highly Commended.

No. 30, 'Improved Musselburgh,' sent by Messrs. Sutton; No. 2, 'Large Early Poitou, sent by Messrs. Barr; No. 14, 'Large Rouen,' sent by Messrs. Barr; No. 26, 'Renton's Monarch,' sent by Messrs. Nutting; No. 22, 'The Lyon,' sent by Messrs. R. Veitch.

Commended.

No. 13, 'Giant Winter,' sent by Messrs. Barr.

Fruit and Vegetable Committee, February 26, 1918.

Mr. W. Poupart in the Chair, and eleven members present.

No exhibits were before the Committee on this occasion, but the awards recommended to Leeks at Wisley by the Sub-Committee were confirmed.

Fruit and Vegetable Committee, March 12, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and ten members present.

Award Recommended :—

Gold Medal.

To Mr. V. Banks of the Food Production Department, for a collection of bottled and dried fruits and vegetables.

Other Exhibits.

Messrs. Cheal, Crawley: dessert Apples.
Mr. T. W. Herbert, Nutfield: Apple 'Nutfield Beauty.'
Mr. G. W. Miller, Wisbech: Rhubarb 'The Sutton.'
Mr. W. Palmer, Andover: Apple 'Lord Kitchener.'
Mr. W. R. Parker-Jervis, Stone: seedling Apple.

A collection of Beet was exhibited from the Society's Gardens at Wisley in a cooked state. All the varieties were sown on July 11, 1917. The trial proved that Beet is perfectly hardy, but that the long-rooted varieties are useless for late summer or early autumn sowing, as they did not develop into a useful size, but that the Egyptian or Turnip-rooted section were very good on a light, warm, well-drained soil like that at Wisley. No protection of any kind was given, and few of this class of Beet were injured by the trying winter. When cooked all were very tender, of good colour, and nicely flavoured. So many were equally satisfactory in all respects that no special variety stood out as particularly meritorious, but any good seedsmen's selected Globe or Egyptian Beet was reliable.

Fruit and Vegetable Committee, March 26, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and twelve members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Dr. H. Watney (gr. Mr. E. Griffin), Pangbourne, for a collection of Apples.

Silver Knightian Medal.

To Messrs. Cheal, Crawley, for a collection of late cooking Apples.

Other Exhibit.

Mr. W. Tayler, Hampton: seedling Apple 'Sunrise.'

Fruit and Vegetable Committee, April 9, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and seven members present.

Awards Recommended :—

Bronze Knightian Medal.

To Mr. W. Peters, Leatherhead, for Apples.

Award of Merit.

To Apple 'Herbert's Prolific' (votes unanimous), from Mr. T. Herbert, Redhill, Surrey. The growth, foliage, and fruit somewhat closely resembles 'Bramley's Seedling,' but it is much earlier in time of coming into use, the fruit being at its best at the end of the year, whereas 'Bramley's Seedling' keeps sound and good till the late spring. The exhibitor says it is quite distinct and his opinion was endorsed by the deputation who went to see the tree in fruit.

Other Exhibit.

R.H.S. Gardens, Wisley : Potatos.

Fruit and Vegetable Committee, April 23, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and fourteen members present.

No awards were recommended on this occasion.

Exhibits.

Mr. W. Crump, V.M.H., Malvern : Apple 'Sandlin Duchess.'
Messrs. Seabrook, Chelmsford : Apple 'Mr. Prothero.'

Fruit and Vegetable Committee, May 7, 1918.

Mr. A. H. Pearson, V.M.H., in the Chair, and twelve members present.

Award Recommended :—

Certificate of Appreciation.

To Messrs. Sutton, Reading, for an exhibit of seedling Potatos.

Other Exhibit.

Mr. F. Davis, Pershore : Apple 'Pershore Pippin.'

Fruit and Vegetable Committee, May 16, 1918.

Sub-Committee at Wisley.

Mr. J. Cheal, V.M.H., in the Chair, and three members present.

The Sub-Committee inspected the trial of autumn-sown Lettuces and made the following recommendations for awards :—

Award of Merit.

No. 4, 'Brittany White Winter,' sent by Messrs. Barr ; No. 55, 'Stanstead Park,' sent by Messrs. Nutting.

Highly Commended.

No. 38, 'Commodore Nutt,' sent by Messrs. Sutton ; No. 34, 'Immense Hardy Green,' sent by Messrs. Webb ; Nos. 12, 13, 14, 'Tom Thumb Re-selected,' sent by Messrs. Carter, Barr & Sydenham ; No. 3, 'Tremont Winter,' sent by Messrs. Barr ; No. 1, 'White Madeira,' sent by Messrs. Barr ; No. 60, 'Wonderful,' sent by Messrs. Webb ; No. 30, 'Yates' Winter,' sent by Messrs. Barr.

Commended.

No. 20, 'McHattie's Giant,' sent by Messrs. Kent & Brydon ; No. 28, 'Schofield's Hardy Winter,' sent by Messrs. Barr.

Fruit and Vegetable Committee, May 28, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and twelve members present.

Awards Recommended :—

Award of Merit.

To Apple 'Pershore Pippin' (votes 8 for), from Mr. F. Davis, Pershore. Fruit of medium size, good shape, skin bronzy green, changing to a deeper bronze with age, and covered with russet, eye partly closed, set in a shallow basin, stalk thin, about ½ inch long, not deeply inserted, flesh very crisp, and of excellent flavour. A meritorious dessert variety, valuable for its lateness and good quality. The tree is said to be a good grower and free bearer.

The awards recommended by the Sub-Committee on May 16, 1918, to Lettuces on trial at Wisley were confirmed.

Other Exhibit.

Mr. W. Crump, V.M.H., Malvern : Apple 'Sandlin Duchess.'

It was proposed by Mr. Owen Thomas and seconded by Mr. Bunyard that the Committee would like to see a collection of the best varieties of Apples and Pears kept at Vincent Square for the inspection of the Committee and for reference. This was carried unanimously.

Fruit and Vegetable Committee, June 18, 1918.

Mr. W. Poupart in the Chair, and nine members present.

No awards were recommended on this occasion.

Exhibits.

Mr. F. H. Chapman, Rye : plants of Dutch Brown Bean.
Messrs. Laxton, Bedford : seedling Strawberries.
Mr. H. Prime, Hatfield : seedling Strawberries.
R.H.S. Gardens, Wisley : Lettuces.
Sir Harry Veitch, Farnham Royal : branch of Apple 'Newton Wonder' affected with silver leaf.

It was proposed by Mr. Owen Thomas and carried unanimously, that a trial of Strawberries from this year's runners be made at Wisley.

Fruit and Vegetable Committee, July 2, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and nine members present.

Award Recommended :—

Award of Merit.

To Melon 'Acquisition' (votes unanimous), from Mrs. B. B. Fox, Brislington House, Bristol (gr. Mr. E. A. Hall). Fruit of medium size, round, bronzy-yellow skin, well netted, flesh scarlet, deep with a small seed cavity, very melting, full of juice, and of exceedingly rich flavour. Stated to be the result of crossing 'Carter's Delicatesse' × 'Sutton's A1.'

Fruit and Vegetable Committee, July 16, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and seven members present.

Award Recommended :—

Gold Medal.

To Messrs. Barr, Taplow, for vegetables.

Other Exhibits.

Mr. Close, Orpington : Currant 'Littlecroft Beauty.'
Messrs. Seabrook, Chelmsford : Apple 'Mr. Prothero.'

FRUIT AND VEGETABLE COMMITTEE, JULY 30, 1918.

Mr. J. CHEAL, V.M.H., in the Chair, and eight members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Dobbie, Edinburgh, for Potatos.

Silver Knightian Medal.

To R. L. Mond, Esq., Sevenoaks, for vegetables and fruit.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 13, 1918.

Mr. J. CHEAL, V.M.H., in the Chair, and ten members present.

No awards were recommended on this occasion.

Exhibits.

Sir A. Cory-Wright, Welwyn: Melon 'Sutton's King George.'
R.H.S. Gardens, Wisley: Apples 'Duchess of Bedford' and 'Premier.'

FRUIT AND VEGETABLE COMMITTEE, AUGUST 22, 1918.

SUB-COMMITTEE AT WISLEY.

Mr. J. CHEAL, V.M.H., in the Chair, and five members present.

The Sub-Committee inspected the trial of Runner Beans and made the following recommendations for awards :—

First-Class Certificate.

No. 28, 'Prizewinner,' sent by Messrs. Dickson & Robinson.

Award of Merit.

No. 14, 'A1,' sent by Messrs. Sutton; No. 24, 'Scarlet,' sent by Messrs. Sutton; *No. 35, 'Scarlet Emperor,' sent by Messrs. Carter.

Highly Commended.

No. 33, 'Best of All,' sent by Messrs. Dickson & Robinson; No. 8, 'Champion Runner,' sent by Messrs. Dobbie; *No. 4, 'Champion Scarlet,' sent by Messrs. Barr; No. 39, 'Giant Exhibition,' sent by Messrs. Dickson & Robinson; *Nos. 1 & 2, 'Hollington Dwarf,' sent by Messrs. Barr & Messrs. Cooper Taber; No. 42, 'Improved Painted Lady,' sent by Messrs. Sutton; No. 43, 'Mikado,' sent by Messrs. Barr; No. 17, 'Red Giant,' sent by Messrs. Carter; *No. 37, 'Scarlet Emperor,' sent by Messrs. Sydenham; No. 49, 'The Czar,' sent by Messrs. R. Veitch.

Commended.

No. 30, 'Best of All,' sent by Messrs. Sutton.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 27, 1918.

Mr. J. CHEAL, V.M.H., in the Chair, and twelve members present.

Awards Recommended :—

Silver Knightian Medal.

To Messrs. Spooner, Hounslow, for Apples.
The awards recommended to Runner Beans by the Sub-Committee were approved.

Other Exhibits.

Messrs. Bunyard, Maidstone: Apple 'Maidstone Favourite.'
A. H. Vaughan-Williams, Esq., Old Windsor: a new cultivator.

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* Specially fitted for market purposes.

Fruit and Vegetable Committee, September 10, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and eleven members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Barr, London, for Tomatos.
To Messrs. Sutton, Reading, for Runner Beans, Tomatos, &c.

Silver Banksian Medal.

To Sir Albert Rollit, D.C.L., Chertsey, for outdoor Figs.

Cultural Commendation.

To Messrs. Barr, London, for Tomato 'Scarlet Beauty.'
To Sir Albert Rollit, D.C.L., Chertsey, for outdoor Figs.

Other Exhibits.

Messrs. Cannell, Eynsford: Apple 'James Lawson' and Tomato 'James Lawson.'
Mr. W. Ingall, Grimoldby: Apple.
Mr. W. Turnell, Rayleigh: Tomato 'Turnell's Market Pride.'

Fruit and Vegetable Committee, September 24, 1918.

Mr. A. H. Pearson, J.P., V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

Gold Medal.

To E. E. Palmer, Esq. (gr. Mr. H. E. Wallis), Sherfield, on Loddon, for vegetables.

Silver-gilt Knightian Medal.

To Messrs. Sutton, Reading, for early maturing vegetables.
To Messrs. Webb, Stourbridge, for vegetables.

Award of Merit.

To Apple 'James Lawson' (votes 6 for, 2 against), from Messrs. Cannell, Eynsford. Raised by crossing 'Gravenstein' and 'Cellini,' this new variety resembles the latter parent in appearance, but is distinct in flavour, being crisp and good. The tree is stated to be of vigorous habit and exceedingly fruitful.

Other Exhibits.

Messrs. Artindale, Sheffield: Potatos.
Mr. B. Bowdler, Shrewsbury: *Rubus palmatus.*
Messrs. H. Chapman, Rye: Marrows.
Mr. W. W. Clarke, Milton: seedling Apple.
Mr. G. Coates, Rugby: Apple 'Autumn Cheer.'

The following awards recommended by the Sub-Committee to Climbing French Beans after trial at Wisley were confirmed :—

First-class Certificate.

No. 129, 'Beurre Couronne d'Or,' sent by Messrs. Vilmorin; No. 87, 'Soissons Blanc à rames,' sent by Messrs. Vilmorin; No. 64, 'Tender and True,' sent by Messrs. Sutton.

Award of Merit.

No. 132, 'Golden Butter,' sent by Messrs. Carter; No. 99, 'Mangetout de St. Fiacre blanc,' sent by Messrs. Vilmorin; No. 62, 'Veitch's Climbing French,' sent by Messrs. Barr; No. 63, 'Tender and True,' sent by Messrs. Barr.

Highly Commended.

No. 70, 'Burger's Green-pod Stringless,' sent by Messrs. Burpee; Nos. 130, 131, 'Beurre du Mont d'Or à rames,' sent by Messrs. Barr & Vilmorin; No. 79, 'Climbing White,' sent by F. J. C.; No. 90, 'Dutch Case Knife,' sent by Messrs. Vilmorin; No. 116, 'Fillbasket,' sent by Messrs. Sutton; No. 66, 'Flageolet Rouge à rames,' sent by Messrs. Vilmorin; No. 77, 'July Climbing,' sent by Messrs. Carter; No. 78, 'Earliest of All,' sent by Messrs. Sutton; No. 113, 'Mangetout de la Vallée,' sent by Messrs. Vilmorin; Nos. 106, 107, 'Mangetout de St. Fiacre' (brown), sent by Messrs. Vilmorin & Barr; No. 85, 'McCasland Pole Bean,' sent by Messrs. Burpee; No. 93, 'Phénomène à rames,' sent by Messrs. Vilmorin.

Commended.

No. 72, 'Kentucky Wonder' (white seed), sent by Messrs. Thorburn; No. 89. 'Soissons Vert à rames,' sent by Messrs. Vilmorin; No. 74, 'Southern Creaseback,' sent by Messrs. Thorburn; No. 69, 'The Admiral Wonder,' sent by Messrs. Barr; No. 88, 'Blanc Géant sans parchemin,' sent by Messrs. Vilmorin.

The following awards recommended by the Sub-Committee to Vegetable Marrows after trial at Wisley were confirmed:—

Award of Merit.

No. 38, 'Pen-y-Byd,' sent by Messrs. Sydenham; No. 35, 'Unique,' sent by Messrs. Yates, Evesham.

Highly Commended.

No. 52, 'Bush Green,' sent by Messrs. Barr; No. 32, 'Cream,' sent by Messrs. Dickson & Robinson; No. 51, 'Early White Bush,' sent by Messrs. Barr; No. 17, 'Long Green,' sent by Messrs. Dobbie.

Commended.

No. 7, 'Long White,' sent by Messrs. Sutton.

Fruit and Vegetable Committee, October 8, 1918.

Mr. A. H. Pearson, V.M.H., J.P., in the Chair, and twenty-five members present.

No awards were recommended on this occasion.

Exhibits.

Mr. E. Ainsley, Swanmore: Apple 'Autumn Pippin.'
Messrs. Bunyard, Maidstone: Apple 'Cutler Grieve.'
Mr. W. Camm, Taplow: Apple 'Cliveden Prolific.'
Mr. J. Crook, Camberley: Runner Beans.
Messrs. Laxton, Bedford: Apple 'Bedford Pippin.'
Lt.-Col. H. L. Webb, Sittingbourne: seedling Apple.

Fruit and Vegetable Committee, October 22, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and ten members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To Messrs. Sutton, Reading, for a collection of vegetables from seeds sown in July and August.

Silver-gilt Banksian Medal.

To Mr. H. Close, Orpington, for Apples.
To Messrs. Felton, London, for commercial fruit.

Certificate of Diligent Interest.

To the girls (aged 9–13) of St. Paul's School, Hammersmith, for collection of vegetables for winter use.

Fruit and Vegetable Committee, November 5, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and fourteen members present.

No awards were recommended on this occasion.

Exhibit.

Mr. J. Leeder, Postwick: Apple 'Leeder's Perfection.'

Fruit and Vegetable Committee, November 19, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and thirteen members present.

Awards Recommended:—

Gold Medal.

To Mr. V. Banks, Food Production Department, for a collection of bottled and dried fruits and vegetables.

Silver-gilt Banksian Medal.

To the Ragged Lands College of Lady Gardeners (Principal, Miss E. More), Glynde, for Apples and Vegetables.

Silver Banksian Medal.

To Mr. R. Staward, Hertford, for Brussels Sprouts.

Other Exhibits.

C. E. Gunther, Esq., Hawkhurst: fruits of *Diospyros Kaki* and Apple 'Citronia.'
R.H.S. Gardens, Wisley: Collection of Brussels Sprouts.

Fruit and Vegetable Committee, December 3, 1918.

Mr. J. Cheal, V.M.H., in the Chair, and fourteen members present.

No exhibits were before the Committee on this occasion.

FLORAL COMMITTEE.

JANUARY 15, 1918.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-one members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Award of Merit.

To Carnation ' Dr. V. G. Ward ' (votes 7 for, 1 against), from F. C. Stoop, Esq. (gr. Mr. G. Carpenter), Byfleet. A bright cerise pink perpetual-flowering variety of medium size with non-splitting calyces. The colour of the flowers is particularly charming under artificial light. The variety appears to be a strong grower.

FLORAL COMMITTEE, JANUARY 29, 1918.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. May, Upper Edmonton, for ferns and Primulas.

Bronze Flora Medal.

To Mr. L. R. Russell, Richmond, for shrubs.

Bronze Banksian Medal.

To Mr. G. Reuthe, Keston, for hardy plants.

Other Exhibits.

Messrs. H. Chapman, Rye : bulbous plants.
Mrs. Dickson Park, Loudwater : *Primula sedgmooriana.*

FLORAL COMMITTEE, February 12, 1918.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-six members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. May, Upper Edmonton, for miscellaneous plants.

Silver Banksian Medal.

To Messrs. Piper, Langley, for hardy plants.

Bronze Flora Medal.

To Misses Allen-Brown, Henfield, for Violets.
To Mr. G. Reuthe, Keston, for hardy plants.
To Messrs. Tucker, Oxford, for alpines.
To Mr. G. G. Whitelegg, Chislehurst, for alpines.

Bronze Banksian Medal.

To Messrs. Cheal, Crawley, for hardy plants.

First-class Certificate.

To *Hamamelis mollis* (votes 15 for, 2 against), from Messrs. R. Veitch, Exeter. This early-flowering Witch-Hazel is a native of China and bears its narrow-petalled, clear golden yellow flowers in great abundance. It is deciduous and quite hardy in this country.

To *Iris* 'Cantab' (votes 19 for, 2 against), from Messrs. H. Chapman, Rye. This charming pale blue Iris received an Award of Merit on February 10, 1914. (See JOURNAL R.H.S. xl. p. liv.)

Award of Merit.

To *Freesia Chapmanii aurantia* (votes 22 for), from Messrs. H. Chapman, Rye. A deep golden yellow variety tinged with orange raised by the exhibitors as the result of a cross between *F. Leichtlinii* ♀ and *F. Chapmanii* ♂.

To *Freesia* 'Lavender Queen' (votes 16 for, 2 against), from Messrs. H. Chapman, Rye. A very pretty pale lilac seedling raised by the exhibitors.

Other Exhibits.

Messrs. Barr, Taplow: alpines.
Messrs. Brown, Stamford: *Primula malacoides.*
Misses Hopkins, Shepperton: hardy plants.
Mr. G. W. Miller, Wisbech: hardy plants.
W. North Row, Esq., Tiverton: *Cardamine enneaphylla.*

FLORAL COMMITTEE, FEBRUARY 26, 1918.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—

Silver Flora Medal.

To W. R. Mond, Esq. (gr. Mr. C. Hall), Sevenoaks, for Schizanthus and *Primula malacoides.*

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. May, Upper Edmonton, for miscellaneous plants.

Bronze Banksian Medal.

To Mr. G. W. Miller, Wisbech, for hardy plants.
To Mr. G. Reuthe, Keston, for hardy plants.
To Messrs. Tucker, Oxford, for alpines.

Award of Merit.

To *Saxifraga Burseriana sulphurea* (votes unanimous), from Messrs. Tucker, Oxford. This plant is said to be the result of a cross between *S. Burseriana* 'Gloria' and *S.* 'Faldonside.' The rounded form of the flowers and the foliage are very similar to those of *S.* 'Faldonside.' The colour of the flowers is pale sulphur-yellow. The plant was raised by Mr. G. H. Simpson Hayward.

To *Saxifraga* × *kewensis rosea* (votes 8 for, 3 against), from Mr. G. Reuthe, Keston. The pale pink, bell-shaped flowers of this charming variety are borne on arching stems 2½ inches long, which with the calyces are of a pretty pink colour and are indeed the most attractive feature of this pretty plant. The flower stems arise from dense tussocks of silvery grey foliage.

Cultural Commendation.

To Mr. T. Temple West, Redhill, for *Lycopodium clavatum* and *Lycopodium dendroideum* in pans.

Other Exhibits.

Messrs. Brown, Stamford: *Primula malacoides* 'Mauve Queen.'
Messrs. H. Chapman, Rye: Freesias.
Misses Hopkins, Shepperton: hardy plants.
Mr. J. J. Kettle, Corfe Mullen: Violet 'Lloyd George.'
Mr. W. R. North-Row, Tiverton: *Cardamine polyphylla.*
Messrs. Veitch, Exeter: *Magnolia Campbelli, Amygdalus persica fl. pl. magnifica.*

Floral Committee, March 12, 1918.

Mr. H. B. May, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Silver Banksian Medal.

To Messrs. Gill, Falmouth, for Rhododendrons.
To Messrs. May, Upper Edmonton, for ferns and miscellaneous plants.
To Mr. G. W. Miller, Wisbech, for hardy plants.
To Mr. G. Prince, Longworth, for Yellow Banksian Rose.
To Mr. L. R. Russell, Richmond, for forced flowering shrubs.

Bronze Flora Medal.

To Mr. G. Reuthe, Keston, for hardy plants.
To Messrs. Tucker, Oxford, for alpines.

Other Exhibits.

Mr. H. Chapman, Rye: *Freesia* 'Twilight.'
Commander L. A. de Sausmarez, R.N., East Molesey: seedling Camellias.
Misses Hopkins, Shepperton: hardy plants.
Messrs. Piper, Langley: hardy plants.

Floral Committee, March 26, 1918.

Mr. H. B. May, V.M.H., in the Chair, and eighteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Silver Banksian Medal.

To Messrs. Gill, Falmouth, for Rhododendrons.
To Messrs. May, Upper Edmonton, for miscellaneous plants.
To Mr. G. W. Miller, Wisbech, for hardy plants.

Bronze Flora Medal.

To Messrs. Bunyard, Maidstone, for flowering shrubs.
To Messrs. Tucker, Oxford, for alpines.

Bronze Banksian Medal.

To Messrs. Piper, Langley, for hardy plants and shrubs.
To Mr. G. Reuthe, Keston, for hardy plants.
To Mr. L. R. Russell, Richmond, for forced flowering shrubs.

Award of Merit.

To *Primula Juliae* var. 'Jewel' (votes 11 for, 4 against), from Mr. B. D. Webster, Newton Abbot. A remarkably fine form of *Primula Juliae* with large, very bright purplish magenta flowers with a golden eye. The plant is very vigorous in habit and is said to have been obtained by crossing *Primula Juliae* and *Primula vulgaris* var. 'Hall's Blue.'

To *Rhododendron* 'Ernest Gill' (votes unanimous), from Messrs. Gill, Falmouth. A very fine Rhododendron bearing compact bold trusses of large bright cerise-pink flowers with a crimson blotch at the base. It is said to be the result of a cross between *R. Luscombei* and *R. Fortunei.*

Other Exhibits.

F. Bibby, Esq., Shrewsbury: *Imantophyllum luteum superbum.*
Misses Hopkins, Shepperton: hardy plants.

Floral Committee, April 9, 1918.

Mr. H. B. May, V.M.H., in the Chair and twenty members present.

Awards Recommended :—

Silver Flora Medal.

To Mr. G. W. Miller, Wisbech, for hardy plants.

Silver Banksian Medal.

To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. Gill, Falmouth, for Rhododendrons.
To Messrs. May, Upper Edmonton, for ferns and miscellaneous plants.
To Mr. G. Prince, Longworth, for Roses.
To Mr. G. Reuthe, Keston, for hardy plants.
To Mr. L. R. Russell, Richmond, for forced shrubs.

Bronze Flora Medal.

To Messrs. Piper, Langley, for hardy plants.
To Mr. C. Turner, Slough, for flowering shrubs.

Award of Merit.

To Rose 'Golden Ophelia' (votes unanimous), from Messrs. B. R. Cant, Colchester. A beautiful golden apricot-yellow seedling from the well-known H. T. Rose 'Ophelia.' Each bloom is of fair size and very compact and is borne on long stiff upright stem which renders it very useful for decorative purposes. The outer petals are slightly paler than the centre of the flower. The variety is a good forcing rose.

Other Exhibits.

Mr. J. Ansaldo, Mumbles : *Primula* 'Mrs. J. Ansaldo.'
Misses Hopkins, Shepperton : hardy plants.

Floral Committee, April 23, 1918.

Mr. H. B. May, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. Gill, Falmouth, for Rhododendrons.

Silver Banksian Medal.

To Messrs. May, Upper Edmonton, for ferns.
To Mr. G. Prince, Longworth, for Roses.

Bronze Flora Medal.

To Mr. G. W. Miller, Wisbech, for hardy plants.

Bronze Banksian Medal.

To Messrs. Felton, London, for Roses and double Gerberas.
To Mr. G. Reuthe, Keston, for hardy plants.

Award of Merit.

To *Daphne rupestris grandiflora* (votes unanimous), from Messrs. Tucker, Oxford. A very pretty small alpine shrub with an abundance of sweetly scented deep rose-pink flowers of considerably larger size than those found in the type.

Other Exhibits.

A. K. Bulley, Esq., Neston : *Primula Harroviana.*
Misses Hopkins, Shepperton : hardy plants.

FLORAL COMMITTEE, MAY 7, 1918.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-one members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To R. L. Mond, Esq. (gr. Mr. Hall), Sevenoaks, for Calceolarias.

Silver Flora Medal.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.
To Mr. L. R. Russell, Richmond, for flowering shrubs and Acers.

Silver Banksian Medal.

To Messrs. Low, Bush Hill Park, for Carnations.
To Mr. G. W. Miller, Wisbech, for hardy plants.
To Messrs. Piper, Langley, for hardy plants.
To Mr. G. Reuthe, Keston, for hardy plants.

Award of Merit.

To Polyanthus 'Miller's Giant Strain' (votes unanimous), from Mr. G. W. Miller, Wisbech. A very fine strain of vigorous and free flowering habit. The individual blooms are very large and include shades of creamy white, primrose, golden yellow, and dark crimson.

To *Primula spicata* (votes unanimous), from Messrs. Wallace, Colchester. This is undoubtedly one of the gems of the genus Primula. It was collected by Mr. Forrest in the Tali region of Yunnan, and was first introduced by Messrs. Bees in 1908. It is said to be hardy and belongs to the Soldanelloides section and has open spikes of pendulous, bell-shaped, sweetly scented flowers of a lovely violet-blue colour tinged with silver meal which is also found on the 4 to 6-inch flower stems and on the calyces.

To *Rhododendron Roylei magnificum* (votes unanimous), from Mr. G. Reuthe, Keston. A very fine form of this hardy Himalayan Rhododendron. The flowers are very much larger than those of the type, and are borne with great freedom. They are orange red, slightly darker on the outside, and in shape vividly suggest the flowers of the Lapageria.

Other Exhibits.

Messrs. Cheal, Crawley: shrubs and Dahlias.
Misses Hopkins, Shepperton: hardy plants.
Messrs. Paul, Cheshunt: *Illicium religiosum.*
Mr. C. Turner, Slough: flowering shrubs.
Mr. W. Wells, jun., Merstham: alpines.

FLORAL COMMITTEE, MAY 28, 1918.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Dickson, Belfast, for Sweet Peas.

Silver Flora Medal.

To Mr. J. Douglas, Great Bookham, for Border Carnations.
To Messrs. May, Upper Edmonton, for ferns and flowering plants.
To Mr. G. W. Miller, Wisbech, for hardy plants.
To Mr. L. R. Russell, Richmond, for Azaleas.
To Messrs. Wallace, Colchester, for Irises.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for flowering trees and shrubs.
To Mr. F. Gifford, Hornchurch, for *Paeonia officinalis lobata.*
To Messrs. Paul, Cheshunt, for flowering shrubs.
To Messrs. Piper, Langley, for hardy plants.
Mr. G. Reuthe, Keston, for hardy plants.

Bronze Banksian Medal.

To Messrs. H. Chapman, Rye, for seedling Irises.
To Messrs. Low, Bush Hill Park, for Carnations.
To Messrs. Tucker, Oxford, for alpines.

Award of Merit.

To *Calceolaria* 'Buttercup' (votes 8 for, 2 against), from Mr. A. Dawkins, Chelsea. A very free-flowering deep-yellow variety about 18 inches high, raised as the result of a cross between the greenhouse *Calceolaria* and the yellow bedding variety.

To Carnation 'Surrey Clove' (votes 10 for), from Mr. J. Douglas, Great Bookham. A medium-sized, dark crimson, very sweetly scented Border Carnation of excellent form.

To Carnation 'The Grey Douglas' (votes unanimous), from Mr. J. Douglas, Great Bookham. A large, full flowered, slaty grey Border Carnation of fine form.

To Lupinus 'Delight' (votes unanimous), from Mr. G. R. Downer, Chichester. The flowers of this beautiful variety are of a dull carmine-lake colour with a plum-purple keel. They are borne on a fine bold spike.

To Lupinus 'May Princess' (votes unanimous), from Mr. G. R. Downer, Chichester. A dark violet-purple variety producing large bold spikes of flowers.

To Sweet Pea 'Mrs. G. W. Bishop' (votes 10 for, 1 against), from Messrs. Dickson, Belfast. The flowers of this variety are of a charming shade of soft cerise pink.

To *Syringa Sweginzowii superba* (votes 15 for, 4 against), from Mr. C. Turner, Slough. A very free-flowering, sweetly scented Lilac from China. The segments of the corolla are white, while the tube is pale lilac-rose. The individual flowers are small, but they are borne in large trusses.

Cultural Commendation.

To Mr. G. W. Miller, Wisbech, for Brompton Stock 'Miller's Giant Purple Lake.'

Other Exhibits.

Messrs. Dobbie, Edinburgh : Sweet Peas.
Misses Hopkins, Shepperton : hardy plants.
Mr. R. C. Notcutt, Woodbridge : Lilac 'Pasteur.'

Floral Committee, June 13, 1918.

Sub-Committee at Wisley.

Mr. H. B. May, V.M.H., in the Chair, and five members present.

The following awards were recommended to Pæonies growing in the trial at Wisley.

Award of Merit.

No. 124, *delicatum*, sent by Messrs. Forbes; Nos. 85, 94, Duchesse de Némours (No. 85 sent in as *alba superba*), both sent by Messrs. Ware; Nos. 90, 114,* *festiva maxima*, sent by Messrs. Ware and Messrs. Kelway; No. 106, Lady A. Duff, sent by Messrs. Kelway.

Highly Commended.

No. 4, Dawn, sent by Messrs. Barr; No. 145, L'Elégante, sent by Messrs. Ware; No. 69, Marshal Oyama, sent by Messrs. Bath; No. 81, Mme. Crousse, sent by Messrs. Bath; Nos. 129, 130, Mons. Chas. Lévêque (syn. Mlle. Léonie Calot), sent by Messrs. Bath and Messrs. Ware; No. 49, The Marquis, sent by Messrs. Kelway; No. 147, Virginie, sent by Messrs. Bath.

Commended.

No. 22, Pride of Langport, sent by Messrs. Kelway; No. 40, Roseen, sent by Messrs. Kelway.

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* No. 114 was sent in as Hon. Mrs. Portman.

Floral Committee, June 18, 1918.

Mr. H. B. May, V.M.H., in the Chair, and twenty-four members present.

The Chairman referred to the great loss sustained by the Floral Committee through the death of Mr. R. Hooper Pearson, and a vote of condolence to his widow and daughter was passed.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Bath, Wisbech, for hardy plants.

Silver-gilt Banksian Medal.

To Messrs. Dobbie, Edinburgh, for Sweet Peas.
To Mr. L. R. Russell, Richmond, for Caladiums &c.

Silver Flora Medal.

To Messrs. Kelway, Langport, for Delphiniums.
To Messrs. May, Upper Edmonton, for ferns and flowering plants.
To Mr. G. W. Miller, Wisbech, for hardy plants.

Silver Banksian Medal.

To Messrs. B. R. Cant, Colchester, for Roses.
To Mr. J. Douglas, Great Bookham, for Border Carnations.
To Rev. J. H. Pemberton, Romford, for Roses.
To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations.

Award of Merit.

To Delphinium 'Mrs. Baker' (votes 13 for, 6 against), from Mr. F. Cresswell, National Filling Factory, Hayes. A very useful Delphinium with a good bold spike bearing large flowers, the outer petals of which are sky-blue, and the inner ones violet-mauve. The eye is whitish.

To Sweet Pea 'Dobbie's Maroon' (votes 10 for, 5 against), from Messrs. Dobbie, Edinburgh. A very large-flowered bright maroon variety.

To Sweet Pea 'Ivorine' (votes 14 for), from Messrs. Dobbie, Edinburgh. A good creamy white Sweet Pea of large size.

To Sweet Pea 'Mrs. Hitchcock' (votes 18 for), from Messrs. Dobbie, Edinburgh. A very pretty variety having pale pink flowers shaded with buff. Some of the flowers of this variety had double standards.

To Sweet William 'Scarlet Beauty' (votes 12 for, 2 against), from Messrs. Dobbie, Edinburgh. A very effective variety with large scarlet flowers. Its striking colour should render it extremely valuable for bedding purposes.

The awards recommended to Pæonies on trial at Wisley were confirmed.

Other Exhibits.

Miss Bayne, Bridge of Allan : Clematis 'Miss Bayne.'
Mr. P. J. Butterfield, Waltham Cross : Geranium 'The Major.'
Messrs. Cheal, Crawley : Dahlias.
Mr. G. R. Downer, Chichester : Gaillardias and Delphiniums.
Mr. W. Easlea, Leigh-on-Sea : Rose 'Romeo.'
Mr. F. Gifford, Hornchurch : Pink 'Glory.'
Mr. P. S. Hayward, Clacton-on-Sea : Hybrid Lilium.
Misses Hopkins, Shepperton : hardy plants.
Mr. H. Howard, Purfleet : *Lilium Howardii.*
R.H.S. Gardens, Wisley : Pæonies.
Mr. C. Turner, Slough : Philadelphus.

Floral Committee, July 2, 1918.

Mr. H. B. May, V.M.H., in the Chair, and twenty-four members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. B. R. Cant, Colchester, for Roses.

Silver Flora Medal.

To Messrs. Alex. Dickson, Belfast, for Roses.
To Mr. L. R. Russell, Richmond, for ornamental foliage.
To Messrs. Wallace, Colchester, for Eremurus.

Silver Banksian Medal.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.
To Mr. G. W. Miller, Wisbech, for hardy plants.
To Messrs. W. Paul, Waltham Cross, for Roses.
To Messrs. Tucker, Oxford, for alpines.

Bronze Flora Medal.

To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Banksian Medal.

To Messrs. Cheal, Crawley, for Dahlias.
To Mr. C. Turner, Slough, for flowering shrubs.

Award of Merit.

To *Campanula kolenatiana* (votes 12 for, 5 against), from Messrs. Tucker, Oxford. A very useful Campanula of extremely free-flowering habit, growing about 1 foot high. The pale violet-blue open bells, about 1 inch in diameter with recurving lobes, are borne four or five on a reddish brown hispid wiry stem. The plant is bushy and compact and carries a large number of flowers at a time.

To *Campanula* ' Phyllis Elliott ' (votes 16 for), from Mr. C. Elliott, Stevenage. This is a very pretty hybrid *Campanula* resulting from a cross between *C. excisa* and *C. arvatica*. The deeply lobed, deep violet-purple flowers about ¾ inch in diameter are borne erect on wiry stems about 4 inches high.

To *Escallonia* × *edinensis* (votes unanimous), from Messrs. G. Paul, Cheshunt. This beautiful hybrid shrub was raised at Edinburgh Botanic Garden as the result of a cross between *E. Philippiana* and *E. punctata*—the same cross as gave rise to *E.* × *langleyensis*. The flowers are rose-pink and are borne all along the arching branches. They open a little later than those of *E.* × *langleyensis*. The leaves are small, dark green and shiny.

Other Exhibits.

Mr. G. R. Downer, Chichester : Gaillardias &c.
Mrs. Ruff, Sharnbrook : Rose ' Irish Elegance.'

Floral Committee, July 16, 1918.

Mr. H. B. May, V.M.H., in the Chair, and twenty-one members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. A. Dickson, Newtownards, for Roses.

Silver-gilt Banksian Medal.

To Mr. L. R. Russell, Richmond, for stove plants.

Silver Flora Medal.

To Mr. J. Douglas, Great Bookham, for Border Carnations.
To Messrs. May, Upper Edmonton, for miscellaneous plants.
To Mr. G. W. Miller, Wisbech, for hardy plants.
To Rev. J. H. Pemberton, Romford, for Roses.

Silver Banksian Medal.

To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. W. Paul, Waltham Cross, for Roses.
To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Flora Medal.

To Messrs. Burch, Peterborough, for Roses.

Bronze Banksian Medal.

To Messrs. Cheal, Crawley, for Dahlias &c.

Award of Merit.

To *Campanula* 'Enchantress' (votes unanimous), from Messrs. Grove, Sutton Coldfield. A very pretty hybrid Campanula resulting from a cross between C. × 'Norman Grove' and *C. Waldensteiniana*. The plant is of tufted habit and about 6 to 8 inches high. The small semi-pendent flowers are about ½ inch in diameter and of a light lilac mauve colour. They incline somewhat to those of *C. Waldensteiniana*. The foliage is small and narrow.

To *Gaultheria trichophylla* (votes unanimous), from Mr. G. Reuthe, Keston. A small procumbent hardy alpine shrub of densely tufted habit. The narrow-oblong stalkless leaves are glossy green above and pale beneath. The plant exhibited bore porcelain-blue fruits as big as large peas. The flowers are pink. This plant is a native of the Himalayas.

To *Yucca Ellacombei* (votes 10 for, 4 against), from Messrs. G. Paul, Cheshunt. A large and imposing Yucca having a flower stem 4 feet high with numerous side branches covered with creamy-white flowers marked with red at the back of the petals. The deep green sharply pointed leaves are somewhat larger than those of *Yucca gloriosa*.

Other Exhibit.

Messrs. Hurst, London : Lobelia 'Opal.'

Floral Committee, July 30, 1918.

Mr. H. B. May, V.M.H., in the Chair, and twenty members present.

Awards Recommended :—

Gold Medal.

To Messrs. Alex. Dickson, Belfast, for Roses.

Silver-gilt Banksian Medal.

To Mr. L. R. Russell, Richmond, for stove plants.

Silver Flora Medal.

To Mr. G. W. Miller, Wisbech, for hardy plants.
To Mr. G. Reuthe, Keston, for hardy plants.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for hardy plants and Dahlias.
To Mr. J. Douglas, Great Bookham, for Border Carnations.
To Messrs. May, Upper Edmonton, for miscellaneous plants.
To Rev. J. H. Pemberton, Romford, for Roses.

Bronze Flora Medal.

To Messrs. W. Paul, Waltham Cross, for Roses.

Bronze Banksian Medal.

To G. Churcher, Esq., Alverstoke, for Gladiolus.

Other Exhibits.

Messrs. Baker, Wolverhampton : *Gentiana lagodechiana*.
Mrs. Bowlby, Waterford : white sport from 'Dorothy Perkins' Rose.

Floral Committee, August 13, 1918.

Mr. H. B. May, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Kelway, Langport, for Gladioli.
To Messrs. May, Upper Edmonton, for ferns and flowering plants.

Silver Banksian Medal.

To Rev. J. H. Pemberton, Romford, for Roses.
To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Flora Medal.

To Messrs. Cheal, Crawley, for Phloxes.

Bronze Banksian Medal.

To Mr. G. W. Miller, Wisbech, for hardy plants.

Cultural Commendation.

To Mr. F. G. Wood, Ashtead, for *Statice incana*.

Other Exhibits.

Messrs. Barr, Taplow : Gladiolus 'Mrs. A. E. Hawley.'
C. J. Lucas, Esq., Horsham : *Evodia* sp.
Mr. L. R. Russell, Richmond : foliage shrubs.
Messrs. R. Veitch, Exeter : shrubs.

Floral Committee, August 27, 1918.

Mr. H. B. May, V.M.H., in the Chair, and twenty members present.

Awards Recommended :—

Gold Medal.

To S. Morris, Esq. (gr. Mr. G. Henley), Norwich, for Montbretias.

Silver-gilt Banksian Medal.

To Mr. L. R. Russell, Richmond, for stove plants.

Silver Flora Medal.

To Messrs. May, Upper Edmonton, for ferns and Bouvardias.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for hardy plants.
To Messrs. Ladhams, Southampton, for Lobelias and Pinks.
To Rev. J. H. Pemberton, Romford, for Roses.
To Mr. G. Reuthe, Keston, for hardy plants.
To Mr. W. Wells, jun., Merstham, for Delphiniums.

Award of Merit.

To Dahlia 'Evelyn' (votes unanimous), from Mr. Jarrett, Anerley. A reddish maroon Collerette variety with créam coloured collar.

To Dahlia 'Marion Walton' (votes unanimous), from Messrs. Stredwick, St. Leonards-on-Sea. A medium-sized Garden Cactus variety with clear pink, pointed florets.

To Dahlia 'Meridian' (votes 7 for, 3 against), from Messrs. Stredwick, St. Leonards-on-Sea. A good yellow Cactus variety.

To Dahlia 'Pennant' (votes unanimous), from Messrs. Stredwick, St. Leonards-on-Sea. A large orange terra-cotta Cactus variety.

To Dahlia 'Pink Apollo' (votes unanimous), from Mr. J. A. Jarrett, Anerley. A lovely rose-pink Dahlia of the Pæony-flowered section.

To Dahlia 'President Wilson' (votes unanimous), from Mr. J. T. West, Brentwood. A very large orange scarlet decorative variety with broad florets. The blooms are supported on fine long stems of great strength.

To Dahlia 'Purple Emperor' (votes unanimous), from Messrs. Stredwick, St. Leonards-on-Sea. A crimson purple decorative Dahlia borne erectly on strong stems.

To Dahlia 'Southern Star' (votes unanimous), from Messrs. Cheal, Crawley. A variety of the Star section. The ground colour of the florets is orange tipped with a shade of cerise and scarlet at the base.

To Dahlia 'Star of Mons' (votes 6 for, 3 against), from Mr. J. A. Jarrett, Anerley. A reddish scarlet Collerette variety with a yellow collar.

To Gladiolus 'Prophetesse' (votes 19 for), from Mr. J. G. Parker, Bitton. A very beautiful ivory-white variety blotched with crimson.

To *Lilium* × *Parkmannii*, Hayward's variety (votes 15 for, 4 against), from Mr. P. S. Hayward, Great Clacton. A remarkable hybrid between *L. speciosum magnificum* and *L. auratum macranthum*, with flattish crimson flowers with reflexing tips. The flowers are very sweetly scented and were cut from the open ground. The spike exhibited bore fifteen flowers.

To *Lobelia* 'Mrs. Humbert' (votes 17 for), from Messrs. Ladhams, Southampton. A hardy border Lobelia growing about three feet high. The plant is much branched and bears good spikes of bright rose-pink flowers which are very decorative.

To *Montbretia* 'Nimbus' (votes unanimous), from S. Morris, Esq. (gr. Mr. G. Henley), Norwich. A very beautiful and distinct variety with slightly incurving petals of orange gold ringed with crimson and having a golden yellow base. It is the result of a cross between 'G. Henley' and 'Pageant.'

To *Montbretia* 'Queen Alexandra' (votes unanimous), from S. Morris, Esq. (gr. Mr. G. Henley), Norwich. The flowers of this erect-growing variety are somewhat reflexed and are light golden orange in colour with crimson at the base. This variety is the result of a cross between 'Queen Boadicea' and 'Pageant.'

To *Montbretia* 'Queen Mary' (votes unanimous), from S. Morris, Esq. (gr. Mr. G. Henley), Norwich. This charming variety resulted from a cross between 'G. Henley' and *tricolor*. The flowers are orange and crimson borne on fine spikes slightly arched at the tip. This and the two preceding varieties were raised by the exhibitor.

Other Exhibits.

Mrs. Harris, Calne: Dahlia seedling.
Mr. A. F. Tofield, Southampton: Dahlia 'Tasmania.'
Mr. C. Turner, Slough: Hibiscus.

Floral Committee, September 10, 1918.

Mr. H. B. May, V.M.H., in the Chair, and twenty members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Mr. G. Reuthe, Keston, for hardy plants.
To Mr. L. R. Russell, Richmond, for stove plants.

Silver Flora Medal.

To Mr. G. W. Miller, Wisbech, for hardy plants.

Silver Banksian Medal.

To Mr. W. Wells, jun., Merstham, for Delphiniums.

Bronze Flora Medal.

To Messrs. Cheal, Crawley, for autumn fruit and foliage.
To Messrs. May, Upper Edmonton, for Veronicas.

Bronze Banksian Medal.

To Messrs. Ladhams, Southampton, for hardy plants.
To Messrs. Wallace, Colchester, for autumn foliage and fruit.

Award of Merit.

To *Berberis concinna* (votes unanimous), from Messrs. Wallace, Colchester. This beautiful shrub was introduced about 1850 by Sir Joseph Hooker from the Sikkim-Himalaya. Its chief beauty is its oblong red berries about ½ to ¾ inch long which are borne in great profusion. The leaves are obovate in shape, tapering at the base, and the midrib ends in a spiny tooth. At the base of each tuft of leaves there are three long spines.

To Dahlia 'Bullfinch' (votes unanimous), from Messrs. Stredwick, St. Leonards-on-Sea. A large deep-scarlet Collerette variety with a yellow collar.

To Dahlia 'Clematis' (votes unanimous), from Messrs. Treseder, Cardiff. A very striking Single Decorative variety, pure mauve in colour.

To Dahlia 'Defiance' (votes unanimous), from Messrs. Burrell, Cambridge. A large-flowered Decorative variety having the ground colour yellow suffused with rosy salmon.

To Dahlia 'Lady Thomas' (votes 6 for, 2 against), from Messrs. Treseder, Cardiff. A white ground Collerette Dahlia heavily suffused with crimson maroon with a light edge and a white collar.

To Dahlia 'Oriole' (votes unanimous), from Mr. J. T. West, Brentwood. A very effective bright fiery red Star variety.

To Dahlia 'Our Annie' (votes unanimous), from Messrs. Burrell, Cambridge. A medium-sized variety having a yellow ground heavily suffused with cerise pink. It belongs to the Decorative section.

To Dahlia 'Cambrai' (votes unanimous), from Mr. J. A. Jarrett, Anerley. A scarlet Collerette variety of medium size with a yellow collar.

To Dahlia 'Rising Star' (votes unanimous), from Messrs. Cheal, Crawley. A good stiff-stemmed variety of the Cosmea section. The florets are deep scarlet tipped with yellow.

To Dahlia 'Sincerity' (votes unanimous), from Messrs. Stredwick, St. Leonards-on-Sea. A large white Decorative variety borne on good stems.

Other Exhibits.

Messrs. Dobbie, Edinburgh: Dahlias.
Messrs. G. Paul, Cheshunt: coned branch of *Larix Kaempferi*.
Messrs. Stokes, Trowbridge: Dahlias.
Mr. C. Turner, Slough: Dahlia 'Ladas.'

Floral Committee, September 24, 1918.

Mr. H. B. May, V.M.H., in the Chair, and twenty members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Mr. E. J. Hicks, Twyford, for Roses.

Silver Floral Medal.

To Messrs. Cheal, Crawley, for Dahlias, shrubs and hardy plants.
To Messrs. May, Upper Edmonton, for ferns and flowering plants.
To Mr. L. R. Russell, Richmond, for Ivies.

Silver Banksian Medal.

To Rev. J. H. Pemberton, Romford, for Roses.
To Messrs. Piper, Langley, for shrubs.
To Mr. W. Wells, jun., Merstham, for Delphiniums.

Bronze Flora Medal.

To Mr. G. Reuthe, Keston, for hardy plants.

Award of Merit.

To Aster 'Robinson, V.C.' (votes 10 for, 2 against), from Mr. W. Wells, jun., Merstham. A good double blue variety.

To Dahlia 'Aladdin' (votes unanimous), from Messrs. Burrell, Cambridge. A very showy orange-red Decorative variety of large size.

To Dahlia 'Dragoon' (votes unanimous), from Messrs. Burrell, Cambridge. A bright red Decorative Dahlia with large florets.

To Dahlia 'Eclipse' (votes unanimous), from Messrs. Burrell, Cambridge. A scarlet Collerette variety with the edges and collar yellow.

To Dahlia 'Hero' (votes unanimous), from Mr. J. T. West, Brentwood. A very dark crimson maroon Decorative Dahlia.

To Dahlia 'Lodestar' (votes unanimous), from Messrs. Stredwick, St. Leonards. A primrose-coloured Decorative variety.

To Dahlia 'Lynx' (votes unanimous), from Mr. J. T. West, Brentwood. An orange-red Collerette variety having the florets tipped with yellow and a yellow collar.

To Dahlia 'Medusa' (votes unanimous), from Messrs. Burrell, Cambridge. A yellow Decorative variety shaded with apricot.

To Dahlia 'Saxon' (votes unanimous), from Mr. J. A. Jarrett, Anerley. An orange-scarlet Collerette variety with yellow edge and collar and a good stiff stem.

To Dahlia 'Sunray' (votes unanimous), from Mr. J. T. West, Brentwood. A large apricot Decorative Dahlia.

To Dahlia 'Sussex Star' (votes unanimous), from Messrs. Cheal, Crawley. A very attractive cerise-pink variety of the Cosmea section.

To Dahlia 'Sonata' (votes 5 for, 1 against), from Mr. J. A. Jarrett, Anerley. A very striking deep-rose Pæony-flowered Dahlia.

To Dahlia 'Star of Jersey' (votes unanimous), from Mr. J. A. Jarrett, Anerley. A deep-rose Collerette variety with white collar.

To Dahlia 'Sydney Jones' (votes unanimous), from Messrs. Stredwick, St. Leonards. A mauve Cactus Dahlia with good stiff stems.

To Dahlia 'White Tip' (votes 5 for, 1 against), from Messrs. Burrell, Cambridge. A maroon crimson single variety with white tips.

Other Exhibits.

E. F. Clark, Esq., Evershot: *Solidago canadensis.*
Mr. J. Fitt, Welwyn: *Lastrea Filix mas cristata elegans.*
Mr. G. W. Miller, Wisbech: hardy plants.
Mr. A. W. Thorpe, Lichfield: Chrysanthemums.
Mr. W. West, Winchester: Streptocarpus 'Mauve Queen.'

Floral Committee, October 8, 1918.

Dahlia Sub-Committee.

Mr. J. Green in the Chair, and six members present.

Awards Recommended:—

Award of Merit.

To Dahlia 'Avoca' (votes unanimous), from Mr. C. Turner, Slough. A very effective deep-pink Star Dahlia with an orange centre. The flowers are borne on good stiff stems.

To Dahlia 'Gorgeous' (votes unanimous), from Messrs. Burrell, Cambridge. A good red Pæony-flowered variety with broad florets.

To Dahlia 'Halo' (votes unanimous), from Messrs. Stredwick, St. Leonards. A mauve Decorative variety with large florets and good stems.

To Dahlia 'Ina' (votes unanimous), from Messrs. Burrell, Cambridge. A good yellow and scarlet Collerette variety.

To Dahlia 'Mauvette' (votes 4 for, 1 against), from Mr. J. A. Jarrett, Anerley. A pinkish mauve Decorative Dahlia with tubular florets.

To Dahlia 'Norah Bell' (votes unanimous), from Messrs. Burrell, Cambridge. A semi-double Decorative variety of great promise. The flowers are bright cerise-pink with a yellow centre and are supported on good stiff stems.

To Dahlia 'Standard' (votes unanimous), from Messrs. Stredwick, St. Leonards. A large rosy mauve Decorative Dahlia.

To Dahlia 'Tendresse' (votes unanimous), from Messrs. Burrell, Cambridge. A white Pæony-flowered variety shaded with pale rose-pink.

To Dahlia 'Trojan' (votes unanimous), from Messrs. Burrell, Cambridge. A large Decorative variety with very dark crimson maroon flowers.

Other Exhibit.

Mr. A. C. Turner, Woking: Seedling Dahlias.

Floral Committee, October 22, 1918.

Mr. H. B. May, V.M.H., in the Chair, and sixteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Cheal, Crawley, for autumn foliage and shrubs.
To Messrs. May, Upper Edmonton, for ferns and Cyclamen.

Silver Banksian Medal.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.
To Mr. F. Lilley, Guernsey, for Nerines.
To Rev. J. H. Pemberton, Romford, for Roses.

Bronze Banksian Medal.

To Mr. G. Reuthe, Keston, for hardy plants.

Award of Merit.

To *Aster* ' Blue Gem ' (votes 13 for), from Messrs. Baker, Wolverhampton. A violet-blue semi-double variety of the Novi-Belgii section flowering during the second half of October. The height of the plant is 5 feet.

To *Aster* ' Brightest and Best ' (votes 12 for, 2 against), from Mr. W. Wells, jun., Merstham. This variety grows from 4 to 5 feet high, and has medium-sized rosy mauve flowers with yellow centres.

To *Nerine* ' Mrs. H. J. Elwes ' (votes 9 for, 4 against), from Messrs. Barr, Taplow. A pale pink variety, deeper at the base, prettily crinkled and borne in good trusses.

To Violet ' Mrs. David Lloyd George ' (votes 12 for, 4 against), from Mr. J. J. Kettle, Corfe Mullen. A large, sweetly scented, single Violet of a deep violet-blue colour with an eye of small white petals. It is said to be the result of a cross between the varieties ' Cyclops ' and ' John Raddenbury.'

Other Exhibits.

Messrs. H. Chapman, Rye : Nerine ' Rotherside,' **A.M.** 1916.
Messrs. Felton, London : Nerines.
Mr. F. Greengrass, Kew : Chrysanthemum ' Joan.'

Floral Committee, November 5, 1918.

Mr. H. B. May, V.M.H., in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. H. J. Jones, Lewisham, for Chrysanthemums.

Silver Flora Medal.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

Silver Banksian Medal.

To Messrs. Wells, Merstham, for Chrysanthemums.

Bronze Banksian Medal.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.
To Mr. G. Reuthe, Keston, for hardy plants.

Award of Merit.

To Chrysanthemum ' Elsie E. Gabriel ' (votes 14 for, 5 against), from C. B. Gabriel, Esq. (gr. Mr. F. J. Bye), Chobham. A large Single variety having several rows of florets of the shade of colour known as crushed strawberry and a greenish eye surrounded by a narrow yellow ring.

Other Exhibits.

Messrs. H. Chapman, Rye : Nerines.
Mr. F. Greengrass, Kew : Chrysanthemums.
Mr. W. Wells, jun., Merstham : hardy plants.

Floral Committee, November 19, 1918.

Mr. H. B. May, V.M.H., in the Chair, and eighteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. H. J. Jones, Lewisham, for Chrysanthemums.

Silver Flora Medal.

To Messrs. May, Upper Edmonton, for ferns and Begonias.

Bronze Banksian Medal.

To Messrs. Godfrey, Exmouth, for Chrysanthemums.

First-class Certificate.

To *Pyracantha Gibbsii* (votes unanimous), from the R.H.S. Gardens, Wisley. This handsome scarlet-berried Fire Thorn received an Award of Merit under the name of *Pyracantha crenulata* on January 5, 1915, when it was exhibited by the Hon. Vicary Gibbs (see R.H.S. Journal, vol. xli. part I., page liv). The plant from which the present specimens were cut is about 15 feet high, and it is one of the hardiest and quickest-growing members of the genus.

Award of Merit.

To Chrysanthemum 'Framfield Glory' (votes 12 for), from Mr. N. Davis, Framfield. A good golden yellow market Japanese variety.

To Chrysanthemum 'Lizzy Roberts' (votes 11 for), from Mr. N. Davis, Framfield. A large yellow Single variety with several rows of florets.

Other Exhibit.

Messrs. H. Chapman, Rye : Nerine 'Gorgeous.'

Floral Committee, December 3, 1918.

Mr. H. B. May, V.M.H., in the Chair, and twenty-four members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

Bronze Flora Medal.

To Messrs. Low, Enfield, for Carnations.

Bronze Banksian Medal.

To Messrs. Godfrey, Exmouth, for Chrysanthemums.
To Messrs. Jones, Lewisham, for Chrysanthemums.

Award of Merit.

To Carnation 'Brilliant' (votes 15 for), from Messrs. Low, Enfield. A good scarlet Perpetual-flowering variety. The flowers are of nice shape, with good calyces and strong wiry stems. A feature of the variety is its pleasing scent.

To Chrysanthemum 'Bronze Molly' (votes 16 for), from Messrs. Godfrey, Exmouth. A good Single bronze variety with good stiff stems. It is a sport from the pink 'Molly Godfrey.'

To Chrysanthemum 'Mrs. H. J. Jones' (votes 13 for), from Messrs. Jones, Lewisham. A pale-pink Single variety with broad florets.

Other Exhibits.

Mr. C. H. Haines, Wandsworth : Chrysanthemum 'Armistice.'
Mr. G. Reuthe, Keston : rare shrubs.

ORCHID COMMITTEE.

January 15, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and sixteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for a group.

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for Odontiodas and Odontoglossums.

Silver Banksian Medal.

To Messrs. J. Cypher, Cheltenham, for Cypripediums.
To Messrs. McBean, Cooksbridge, for Cymbidiums.
To Messrs. Hassall, Southgate, for hybrids.

Award of Merit.

To *Laeliocattleya* × 'Oenius,' Bryndir variety (*L.-c.* × 'Coronis' × *C.* × 'Enid') (votes 14 for), from Dr. Miguel Lacroze, Roehampton. Flowers apricot yellow with a pale rose shade. Lip vinous crimson.

To *Cypripedium* × *Matthewsianum*, Usk Priory variety ('Thalia' var. 'Mrs. F. Wellesley' × 'Hera Euryades') (votes 11 for), from R. Windsor Rickards, Esq., Usk Priory, Monmouthshire. Nearest to *C.* × 'Thalia' and of good form. Dorsal sepal white with claret-purple lines and a small emerald green base.

Preliminary Commendation.

To *Odontoglossum* × 'Apollo' (*Armstrongiae* × 'Queen Mary') (votes unanimous), from Messrs. Armstrong & Brown. A large blush white flower with dark claret blotches.

To *Odontoglossum* × 'Peerless,' Orchidhurst var. (*Ossulstonii* × *eximium*) (votes 8 for, 4 against), from Messrs. Armstrong & Brown. Flower dark claret with white margins and tips to the segments.

Other Exhibits.

Dr. Miguel Lacroze : *Odontioda* × 'Madeline,' Bryndir variety.
His Grace the Duke of Marlborough : Cypripediums.
R. Windsor Rickards, Esq. : Cypripediums.
Walter Cobb, Esq. : *Miltonia Phalaenopsis*, Cobb's variety.
Messrs. Sanders : *Cymbidium* × 'Albatross' (*Gottianum* × *grandiflorum*).
Messrs. Flory & Black : hybrid Odontoglossums.

Orchid Committee, January 29, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and fifteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for hybrid Odontoglossums, Odontiodas and Cattleyas.

To Messrs. Charlesworth, Haywards Heath, for Cypripediums, Laeliocattleyas and rare species.

Silver Banksian Medal.

To Messrs. Hassall, Southgate, for hybrid Cymbidiums.

First-class Certificate.

To *Cypripedium* × 'Eurybiades,' 'The Baroness' ('Hera Euryades' × 'Alcibiades') (votes 13 for), from Baron Bruno Schröder, The Dell, Englefield Green (gr. Mr. J. E. Shill). One of the best developments of the *C.* × 'Hera Euryades' class. Dorsal sepal large circular in form, pure white with claret spotting and small gamboge yellow base. Petals and lip tinged mahogany red.

To *Cattleya* × 'Monarch,' Bryndir variety (*Trianae* × 'Empress Frederick') (votes 11 for), from Dr. Miguel Lacroze, Bryndir, Roehampton. A finely formed and large flower, pale rose, with ruby-purple lip, having yellow lines at the base.

Preliminary Commendation.

To *Odontoglossum* × 'Gatton Princess' (*eximium* × 'Queen of Gatton') (votes unanimous), from Sir Jeremiah Colman, Bart., Gatton Park (gr. Mr. Collier). A seedling with first flowers of fine shape, ruby red, with slight white markings and margin.

Other Exhibits.

Sir Jeremiah Colman, Bart.: *Cypripedium insigne*, Gatton Park var.
Dr. Miguel Lacroze: hybrids.
Colonel Leith, Riding Mill-on-Tyne: *Odontoglossum* × 'Colonel Leith' (*Rossii* × *Uro-Skinneri*).
Messrs. Sanders, St. Albans: *Cymbidium* × 'Albatross.'

ORCHID COMMITTEE, FEBRUARY 12, 1918.

Sir JEREMIAH COLMAN, Bart., in the Chair, and twenty-two members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells, for hybrid Odontoglossums, Odontiodas and Cattleyas.

To Messrs. Charlesworth, Haywards Heath, for hybrid Cypripediums and Odontoglossums.

Silver Banksian Medal.

To Messrs. J. Cypher, Cheltenham, for hybrid Cypripediums, including the new *C.* × 'Lloyd George' (*Beeckmanii* × *aureum Hyeanum*).

To Messrs. McBean, Cooksbridge, for Cymbidiums.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for hybrids.

To Messrs. Hassall, Southgate, for Cymbidiums.

To Messrs. Sanders, St. Albans, for a group.

First-class Certificate.

To *Cypripedium* × 'Eurybiades' *Shillianum* ('Hera Euryades' × 'Alcibiades') (votes 14 for, 1 against), shown by Mr. J. E. Shill, The Dell Gardens, Englefield Green. Flower of the largest in its class. Dorsal sepal white with pale green base and distinct claret-purple blotches. Petals and lip tinged with reddish-purple, the petals having dark spotting on the lower half.

To *Odontioda* × 'Memoria F. M. Ogilvie' (parentage unrecorded) (votes unanimous), from Mrs. Ogilvie, The Shrubbery, Oxford. A showy form, retaining the rich red colouring of the *Cochlioda Noezliana* ancestor, with the large size of the Odontoglossum parent. Flowers claret red with slight white markings, the lip having a pink front lobe.

To *Cymbidium* × *Alexandri album* (*eburneo-Lowianum* × *insigne*) (votes unanimous), from Messrs. McBean. The first wholly white form of this hybrid to be shown.

Award of Merit.

To *Odontoglossum* × 'Gatton Emperor' (*Lambeauianum* × hybrid) (votes unanimous), from Sir Jeremiah Colman, Bart. (gr. Mr. Collier). Flower of good size and shape, violet with white margins and tips to the segments.

Preliminary Commendation.

To *Odontioda* × 'Norah' (*Odm.* × 'Aireworth' × *Oda.* × *Schroederi*) (votes unanimous), from Messrs. Charlesworth. Flowers deep bronzy red, with white front to the lip.

To *Odontoglossum* × 'Nora' (*illustrissimum* × 'Dora') (votes unanimous), from Messrs. Armstrong & Brown. Flower dark Indian red, with silver margin and evenly spotted lip.

Other Exhibits.

Dr. Miguel Lacroze: hybrids.

Mrs. Ogilvie: *Cypripedium* × 'Winsum' (*callosum Sanderae* × 'Winifred Hollington').

Messrs. Flory & Black: seedling Odontoglossums and *Laeliocattleya* × 'Trident.'

ORCHID COMMITTEE, FEBRUARY 26, 1918.

Sir JEREMIAH COLMAN, Bart., in the Chair, and sixteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for hybrids.

To Messrs. Charlesworth, Haywards Heath, for Odontoglossums and Odontiodas.

Silver Banksian Medal.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for a group.

To Messrs. Sanders, St. Albans, for Cymbidiums and Brassocattleyas.

To Messrs. Hassall, Southgate, for Cymbidiums.

To Messrs. McBean, Cooksbridge, for a group.

First-class Certificate.

To *Laeliocattleya* × *Schroederae* (*L.-c.* × 'Bella' *alba* × *C.* × 'Maggie Raphael' *alba*) (votes 14 for), shown by Mr. J. E. Shill, The Dell Gardens, Englefield Green. Flowers formed like *L.-c.* × 'Bella,' white with violet-mauve lip.

To *Odontoglossum* × 'St. James' (*amabile* × 'Amethyst') (votes 15 for, 1 against), from Messrs. Charlesworth. Flowers large bright purple with broad white margin.

Award of Merit.

To *Laeliocattleya* × 'Beatrice' var. 'Bryndir' (*C. Schroederae* × *L.-c.* × *callistoglossa*) (votes 14 for), from Dr. Miguel Lacroze, Bryndir, Roehampton. Sepals and petals broadly ovate, blush rose, lip ruby-purple with yellow disc.

To *Laeliocattleya* × 'Eunice' *alba* (*L. anceps alba* × *C. chocoensis alba*) (votes unanimous), from Messrs. McBean, Cooksbridge. Flowers pure white, nearest to *L. anceps* in form but larger.

To *Sophrolaeliocattleya* × *bletchleyflora vivicans* (*L.-c.* × *bletchleyensis* × *S. grandiflora*) (votes unanimous), from Messrs. Stuart Low, Jarvisbrook, Sussex. Flowers brilliant dark scarlet with yellow markings on the lip.

Preliminary Commendation.

To *Aeridovanda* × *Mundyi* (*Aerides vandarum* × *Vanda teres*) (votes unanimous), from Sir Jeremiah Colman, Bart., Gatton Park, Surrey (gr. Mr. Collier). The first cross between the two genera and quite intermediate between the species employed in its production. Flowers silver white with a slight lilac shade and some pale yellow markings on the basal half of the lip.

To *Odontioda* × 'Juliet' (*Oda.* × *Bradshawiae* × *Odm.* × *promerens*) (votes unanimous), from Messrs. Charlesworth. Flowers reddish mauve with slight rose markings.

To *Odontioda* × *Armstrongii*, Orchidhurst var. (*Oda.* × *Vuylstekeae* × *Odm.* × *Armstrongiae*) (votes unanimous), from Messrs. Armstrong & Brown. A broad-petalled flower, deep rosy mauve, with rose spotting on the white front of the labellum.

Other Exhibits.

J. Bridson Seatle, Esq., Putney: *Odontioda* × *Graireana* var. 'May.'

Dr. Miguel Lacroze: *Odontioda* × 'Ethel,' Bryndir variety.

Sir Jeremiah Colman, Bart.: *Sarcochilus Hartmanni* and *S. Fitzgeraldii*, each with eighteen spikes.

Orchid Committee, March 12, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and sixteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells, for hybrid Odontoglossums, Odontiodas and Cattleyas.
To Messrs. Charlesworth, Haywards Heath, for Odontoglossums and other hybrids.

Silver Banksian Medal.

To Mrs. F. M. Ogilvie, The Shrubbery, Oxford (gr. Mr. Balmforth), for hybrids.
To Messrs. Hassall, Southgate, for Cymbidiums.
To Messrs. Sanders, St. Albans, for a group.

First-class Certificate.

To *Cattleya* × 'Clotho' var. 'General Pershing' ('Enid' × *Trianae* 'Grand Monarch') (votes unanimous), from Messrs. Charlesworth. Flower of the largest and perfect in form, light rose with claret-red front to the lip.
To *Odontioda* × 'Windsor' (*Oda.* × *Sanderae* × *Odm.* × *illustrissimum*) (votes unanimous), from Messrs. Flory & Black, Slough. A near approach to the long-desired scarlet Odontoglossum, the flower being equal to a good *O. crispum*, but of a rich dark scarlet colour.

Award of Merit.

To *Sophrocattleya* × 'Ramillies' var. 'Mrs. J. Ansaldo' (*S.-c.* × *warnhamiensis* × *C.* × 'Empress Frederick') (votes unanimous), from J. Ansaldo, Esq., Rosebank, Mumbles. Flower salmon pink with purplish rose lip having a yellow disc.
To *Odontioda* × 'Alcantara' var. *rubra* (*Oda.* × *Cooksoniae* × *Odm.* × *eximium*) (votes unanimous), from Messrs. Charlesworth. Sepals and petals deep vinous red with yellow crest to the lip.
To *Cattleya* × *Cappei alba* (*Schroederae alba* × *Trianae alba*) (votes unanimous), from Messrs. Armstrong & Brown. A well-formed flower of large size, clear white, with pale yellow centre to the lip.

Cultural Commendation.

To Mr. Thurgood, gr. to H. T. Pitt, Esq., Stamford Hill, for a fine specimen of *Neomoorea irrorata*.

Other Exhibits.

Messrs. Flory & Black: hybrids.
H. T. Pitt, Esq.: *Miltonia* × 'Venus.'

Orchid Committee, March 26, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and sixteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for hybrid Odontoglossums and Odontiodas, with rare species.
To Messrs. Charlesworth, Haywards Heath, for Odontoglossums and Laeliocattleyas.

Silver Banksian Medal.

To Messrs. Sanders, St. Albans, for Cymbidiums.
To Messrs. Stuart Low, Jarvisbrook, for Laeliocattleyas.

Award of Merit.

To *Dendrobium* × 'Alpha' var. 'Eleanor' (*euosmum* × *regium*) (votes 10 for, 3 against), from Sir Jeremiah Colman, Bart., Gatton Park, Surrey (gr. Mr.

Collier). Flowers closely resembling those of *D. regium*, but larger, rose pink with white base to the lip.

To *Brassocattleya* × 'Doris,' Langley var. (*C.* × 'Lord Rothschild' × *B.-c.* 'Madame Chas. Maron') (votes unanimous), from Messrs. Flory & Black, Slough. A large mauve-coloured variety with yellow disc to the lip, which has dark purple lines at the base.

Other Exhibits.

Sir Jeremiah Colman, Bart.: *Odontoglossum* × *illustrissimum purpureum* and cut flowers of Dendrobiums.

Dr. Miguel Lacroze: *Odontoglossum* × 'San-Luis' (*eximium* × 'Fascinator').

J. Ansaldo, Esq.: *Laeliocattleya* × 'J. Ansaldo' (*Haroldiana* × unrecorded).

Pantia Ralli, Esq.: *Brassocattleya* × *Digbyano-Schroederae Bradshawiae.*

Messrs. Flory & Black: *Brassocattleya* × 'Rosita' (*B.-c.* × 'Ilene' × *C. Dowiana.*

Orchid Committee, April 9, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and sixteen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells, for hybrid Odontoglossums.

Silver Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for Odontiodas and Odontoglossums.

Bronze Banksian Medal.

To Messrs. C. F. Waters, Balcombe, Sussex, for Dendrobiums.

Award of Merit.

To *Odontoglossum crispum* 'Oakwood Triumph' ('Phœbe' × 'Leonard Perfect') (votes unanimous), from Mrs. Norman C. Cookson, Oakwood, Wylam-on-Tyne (gr. Mr. H. J. Chapman). An improvement on 'Leonard Perfect.' The broad margins and tips of the sepals and petals are white, the inner two-thirds ruby red. Lip white with chestnut-red blotches in front of the yellow crest.

To *Odontoglossum* × 'Jasper' var. 'Roehampton' (*crispum* × *amabile*) (votes 9 for, 4 against), from Dr. Miguel Lacroze, Bryndir, Roehampton (orchid-grower, Miss Robertson). A fine flower with lilac-tinted ground spotted with claret over the greater part of its surface, the front of the lip being white.

To *Odontioda* × *Ernestii* (*Odm.* × *Wilckeanum* × *Oda.* × *Charlesworthii*) (votes unanimous), from E. R. Ashton, Esq., Broadlands, Camden Park, Tunbridge Wells. Sepals and petals buff yellow heavily blotched with Indian red. Lip yellow with a rose shade and dark red blotches at the base.

Preliminary Commendation.

To *Odontoglossum crispum* 'The President' (votes 13 for), from Messrs. Charlesworth. A good home-raised seedling of the typical white class.

To *Odontoglossum* × 'Amazon' (*crispum* × *mirum*) (votes unanimous), from Messrs. Armstrong & Brown. Flower large and of broad proportions; white with ruby-red blotches.

Other Exhibits.

Mrs. F. M. Ogilvie, The Shrubbery, Oxford (gr. Mr. Balmforth): choice orchids.

H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood): *Cymbidium* × *Lowgrinum*, Rosslyn var.

Orchid Committee, April 23, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and fifteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for Odontiodas, Odontoglossums and Miltonias.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for Miltonias, Cattleyas, &c.

To Messrs. Charlesworth, Haywards Heath, for Odontoglossums, Dendrobiums, &c.

Silver Banksian Medal.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for Laeliocattleyas.

Bronze Banksian Medal.

To Messrs. C. F. Waters, Balcombe, for hybrid Dendrobiums.

First-class Certificate.

To *Brassocattleya* × ' Princess Mary ' (*B.-c.* × *Digbyano-Schroederae* × *C. chocoensis alba*) (votes 8 for), from Messrs. Flory & Black, Slough. In shape resembling *C. Schroederae*, but with fringed lip. Colour blush white with orange disc to the lip.

Award of Merit.

To *Odontioda* × ' Joan ' var. ' Roehampton ' (*Oda.* × *Charlesworthii* × *Odm.* × *ardentissimum*) (votes 12 for), from Dr. Miguel Lacroze, Bryndir, Roehampton (orchid-grower, Miss Robertson). Flower large dark claret colour with slight white margin.

Preliminary Commendation.

To *Odontoglossum* × ' Miguelito ' (' Dora ' × ' Doris ' *magnificum*) (votes 13 for), from Dr. Lacroze. Ground colour white with large claret-coloured blotches.

To *Odontoglossum* × ' General Foch ' (*Armstrongiae* × ' Colossus ') (votes unanimous), from Messrs. Armstrong & Brown. A new seedling bearing a flower three and a half inches across ; white finely blotched with violet.

Other Exhibits.

Dr. Miguel Lacroze : *Brassocattleya* × ' Beaumont ' (*B.-c.* × *Cliftonii* × *C.* × ' Empress Frederick ') and *Odontoglossum* × ' Catamarca ' (*sceptrum* × *Fascinator*).

Mr. J. E. Shill : *Odontioda* × ' The Duchess ' (parentage unrecorded).

Messrs. Flory & Black : *Cattleya* × ' Peter ' (*Hardyana* × ' Venus ').

Orchid Committee, May 7, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and sixteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells, for hybrid Odontoglossums and Odontiodas.

To Messrs. Charlesworth, Haywards Heath, for Odontoglossums and Laeliocattleyas.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for hybrid Orchids.

Silver Banksian Medal.

To Messrs. C. F. Waters, Balcombe, for Dendrobiums.

Cultural Commendation.

To Mr. J. Collier, gr. to Sir Jeremiah Colman, Bart., for a fine specimen of *Laeliocattleya* × ' J. F. Birkbeck,' Fowler's variety, with six large white flowers with ruby-crimson lip. The plant was awarded a F.C.C. March 30, 1915.

Other Exhibits.

Sir Jeremiah Colman, Bart.: *Odontoglossum* × ' Gatton Princess ' (' Queen of Gatton ' × *eximium*).

A. P. Cunliffe, Esq., Woodford, Salisbury: *Cattleya* × ' Tityus ' (' Enid ' × ' Octave Doin ').

ORCHID COMMITTEE, MAY 28, 1918.

Sir HARRY J. VEITCH in the Chair, and thirteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells, for hybrids, including new Odontoglossums and Odontiodas.

To Messrs. Charlesworth, Haywards Heath, for home-raised Miltonias and Odontoglossums.

Silver Flora Medal.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for Cattleyas and Laeliocattleyas.

Award of Merit.

To *Odontoglossum crispum* ' Beauty of Ashtead ' (votes 8 for), from Pantia Ralli, Esq., Ashtead Park, Surrey (orchid-grower, Mr. W. H. White). Home-raised by fertilizing *O. crispum* ' Empress of India ' with ' Rossendale.' Flowers large, heavily blotched with dark red. Margin broad, white.

Preliminary Commendation.

To *Odontioda* × ' Juno ' (*Odm.* × *eximillus* × *Oda.* × ' Coronation ') (votes 10 for), from Messrs. Armstrong & Brown. Ground colour white, the inner two-thirds of the segments blotched ruby-red. Lip white with ruby-red blotches.

Other Exhibits.

Sir Jeremiah Colman, Bart.: flowers of three hybrid Odontoglossums.
Pantia Ralli, Esq.: *Odontoglossum crispum* ' Masterpiece.'
Dr. Miguel Lacroze: *O. crispum* ' Miss Robertson.'
Messrs. J. & A. McBean: *Dendrobium Sanderae.*
Walter Cobb, Esq.: cut spikes of *Dendrobium Lyonii* and *Odontioda* × *Bradshawiae*, Cobb's variety.

ORCHID COMMITTEE, JUNE 18, 1918.

Sir JEREMIAH COLMAN, Bart., in the Chair, and sixteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for new and rare hybrids.

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for home-raised Miltonias and Odontoglossums.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for Laeliocattleyas and white *Cattleya Mossiae.*

First-class Certificate.

To *Miltonia* × ' Lady Veitch ' (*vexillaria* ' Memoria G. D. Owen ' × ' Jules Hye de Crom ') (votes 11 for), from Messrs. Armstrong & Brown. A very distinct pure white flower with a dark maroon disc at the base of the lip.

To *Odontoglossum* × *promerens xanthotes* (*crispum xanthotes* × *eximium xanthotes*) (votes 13 for, 1 against), from Messrs. Armstrong & Brown. The plant bore a fine spike of sixteen large pure white flowers with the characteristic pale yellow markings peculiar to the xanthotes race of Odontoglossums.

Award of Merit.

To *Odontoglossum crispum* 'The Britisher' (votes 13 for, 3 against), from Mrs. M. F. Ogilvie, The Shrubbery, Oxford (gr. Mr. Balmforth). A large home-raised typical white *O. crispum* with well-formed flowers.

To *Odontioda* × 'Trebizond' (*Odm.* × *Fascinator* × *Oda.* × *Charlesworthii*) (votes 12 for, 2 against), from G. W. Bird, Esq., Manor House, West Wickham (gr. Mr. Redden). Flowers equal in size and form to the Odontoglossum parent, in colour reddish claret with a very narrow silvery margin.

To *Disa* × 'Italia' (× *Blackii* × *grandiflora*) (votes unanimous), from Messrs. Flory & Black. The largest of the hybrid Disas. Lateral sepals rosy mauve, galea white inside, unspotted.

Preliminary Commendation:

To *Odontoglossum* × *Armstrongii* (*crispum* × *Armstrongiae*) (votes unanimous), from Messrs. Armstrong & Brown. Flower large white with massive violet-blue markings.

Other Exhibits.

H. T. Pitt, Esq.: *Epidendrum* (*Nanodes*) *Medusae.*
Messrs. Flory & Black: hybrid Odontoglossums.

ORCHID COMMITTEE, JULY 2, 1918.

Sir JEREMIAH COLMAN, Bart., in the Chair, and thirteen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells, for hybrid Orchids.

To Messrs. Charlesworth, Haywards Heath, for Miltonias and other hybrids.

Preliminary Commendation.

To *Odontoglossum* × 'Jasper,' Ashtead Park var. (*crispum* × *amabile*) (votes 6 for, 3 against), from Pantia Ralli, Esq., Ashtead Park, Surrey (orchid-grower, Mr. W. H. White). Flower white with clusters of dark purple blotches in the middle of each segment.

To *Odontoglossum* × *promerens* 'Princess Mary' (*eximium* × *crispum*) (votes unanimous), from Messrs. Armstrong & Brown. A very distinct variety of fine shape; white with two broad irregular bands of reddish-mauve colour on each of the sepals and petals.

ORCHID COMMITTEE, JULY 16, 1918.

Sir JEREMIAH COLMAN, Bart., in the Chair, and nineteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for Cattleyas and Laeliocattleyas.

Silver Flora Medal.

To Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells, for hybrid Odontiodas and Odontoglossums.

To Messrs. Charlesworth, Haywards Heath, for hybrid Miltonias, Cattleyas, &c.

Award of Merit.

To *Odontoglossum* × 'Queen Alexandra' var. 'de Barri' (*Harryanum* × *triumphans* var. 'Lionel Crawshay') (votes 15 for, 3 against), from de Barri Crawshay, Esq., Rosefield, Sevenoaks. A very handsome form with large yellow flowers the sepals and petals of which are heavily blotched with red-brown. Lip broad, white in front with purple markings around the prominent yellow crest.

Preliminary Commendation.

To *Odontioda* × 'Cheribon' (*Oda.* × *Vuylstekeae* × *Odm.* × 'Mars') (votes 9 for, 3 against), from Messrs. Armstrong & Brown. Flower of good size and shape, ruby red with slight white markings on the margin. Lip dark red at the base, the front white freckled with rose.

Other Exhibits.

H. T. Pitt, Esq.: *Dendrochilum filiforme.*
Mr. J. E. Shill: *Cattleya* × *Dupreana* (*Warneri* × *Warscewiczii*).
Messrs. Flory & Black: *Sophrolaeliocattleya* × 'Vesuvius' (*S.-l.-c.* × 'Marathon' × *L.-c.* × 'Nella').

ORCHID COMMITTEE, JULY 30, 1918.

Sir JEREMIAH COLMAN, Bart., in the Chair, and fourteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for Laeliocattleyas and Odontoglossums.
To Messrs. Stuart Low, Jarvisbrook, Sussex, for *Cattleya Warscewiczii* and hybrids.

First-class Certificate.

To *Laeliocattleya* × 'Britannia' *majestica* (*L.-c.* × *Canhamiana alba* × *C. Warscewiczii* 'Frau M. Beyrodt') (votes unanimous), from Messrs. Charlesworth, Haywards Heath. The plant bore a spike of four very large snow-white flowers, with Tyrian purple front to the lip, which has a chrome-yellow centre.

Preliminary Commendation.

To *Odontoglossum* × 'Marne' (*ardentissimum*, Orchidhurst var. × 'Colossus') (votes unanimous), from Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells. A new seedling with a large and finely formed white flower, the inner two-thirds of the segments of which are densely blotched with violet.

Other Exhibits.

Dr. Miguel Lacroze: *Odontoglossum* × 'Cordoba' ('Doris' × *eximium*) and *Cattleya* × 'Hesta' var. 'Bryndir.'
Messrs. McBean, Cooksbridge: hybrids.

ORCHID COMMITTEE, AUGUST 13, 1918.

Sir HARRY J. VEITCH in the Chair, and fourteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for Cattleyas, Laeliocattleyas and Odontoglossums.
To Messrs. Stuart Low, Jarvisbrook, Sussex, for *Cattleya Warscewiczii*, with from five to eight flowers on a spike.

Award of Merit.

To *Cattleya* × 'Hesta' *alba* ('Suzanne Hye de Crom' × *Warscewiczii* 'Frau M. Beyrodt') (votes unanimous), from Messrs. Charlesworth. The first albino of the cross, the others having coloured labellums.
To *Laeliocattleya* × 'Appam' (*L.-c.* × 'Scylla' × *C. Dowiana aurea*) (votes unanimous), from Messrs. Charlesworth. The inflorescence bore three flowers, deep golden yellow with ruby-purple lip.

Other Exhibits.

Messrs. Sanders, St. Albans: *Cattleya* × *Hardyana* 'Marshal Foch,' with white sepals and petals, and violet-purple lip with yellow disc.

Orchid Committee, August 27, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and fifteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for Cattleyas and Laeliocattleyas.

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for hybrids.
To Messrs. Hassall, Southgate, for white-petalled forms of *Cattleya Hardyana.*

First-class Certificate.

To *Cattleya* × *Hardyana alba* var. ' President Wilson ' (*Dowiana aurea* × *Warscewiczii*, white variety) (votes unanimous), from Messrs. Flory & Black, Slough. A very fine form with pure white sepals and petals, and broad claret-crimson lip.

Award of Merit.

To *Cattleya* × ' Iris,' Ansaldo's var. (*bicolor* × *Dowiana aurea*) (votes unanimous), from J. Ansaldo, Esq., Rosebank, Mumbles. Sepals and petals broad, sap green tinged with purple. Lip deep purplish crimson, with gold markings in the centre.

To *Cattleya* × ' Aeneas ' (' Venus ' × *Dowiana aurea*) (votes unanimous), from Messrs. Charlesworth. Flower of medium size, sepals and petals bright yellow. Lip ruby crimson, with gold veining from base to centre.

Orchid Committee, September 10, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and nine members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Stuart Low, Jarvisbrook, Crowborough, for hybrid Orchids and rare species.

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for home-raised Miltonias, Cattleyas, and Laeliocattleyas.

First-class Certificate.

To *Laeliocattleya* × ' President Wilson ' (*L.-c.* × ' Thyone ' × *C. Dowiana aurea*) (votes unanimous), from Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells. A grand new hybrid, the largest, most perfectly formed and best of its class. Flowers nearest to *C. Dowiana* ' Rosita,' but larger. Sepals and petals bright yellow ; lip magenta crimson with bright yellow centre and light orange lines extending from base to front.

Award of Merit.

To *Brassocattleya* × ' Olympus,' Langley variety (*B.-c.* × ' Madame Ch. Maron ' × *C.* × *Hardyana*) (votes unanimous). Flower large, the lip being specially broad and having the median area clear yellow. Sepals, petals, and front of lip white tinged with mauve.

Other Exhibits.

Messrs. Armstrong & Brown : *Cattleya* × ' Ella,' Orchidhurst var. (*bicolor* × *Warscewiczii*).
Messrs. Flory & Black : *Cattleya Warscewiczii*, white-petalled variety.
Messrs. Stuart Low : *Cattleya* × ' Iris ' var. ' Buttercup.'

ORCHID COMMITTEE, SEPTEMBER 24, 1918.

Sir JEREMIAH COLMAN, Bart., in the Chair, and seventeen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for Cattleyas, Laeliocattleyas, and other hybrids.

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, Sussex, for hybrids and interesting species.

Award of Merit.

To *Laeliocattleya* × 'Ivanhoe' (*L.-c.* × *eximia* × *C. Dowiana aurea*) (votes 11 for, 3 against), from Baron B. Schröder, The Dell, Englefield Green. A large flower with bright rose sepals and petals and ruby-crimson lip with yellow disc.

To *Cattleya* × 'King Victor' ('Rhoda' × 'Octave Doin') (votes 9 for, 3 against), from Messrs. Flory & Black, Slough. Sepals and petals rosy-mauve freckled on the outer halves with cream colour. Lip claret crimson with well-defined gold lines from the base.

Other Exhibits.

Messrs. Armstrong & Brown, Tunbridge Wells: hybrids, including three dissimilar forms of *Laeliocattleya* × 'Golden Wren' (*L.-c.* × 'Thyone' × *C. iridescens*), *Cattleya* × 'Venus' and *C.* 'Iris,' Orchidhurst var.

Messrs. Stuart Low: the trigeneric hybrid *Lowara* × *insignis* (*Sophronitis grandiflora* × *Brassolaelia* × 'Helen').

Mr. W. J. Kaye, Surbiton: a good form of *Laeliocattleya* × 'Bola' (*L.-c.* × *callistoglossa* × *C. labiata*).

ORCHID COMMITTEE, OCTOBER 22, 1918.

Sir JEREMIAH COLMAN, Bart., in the Chair, and fourteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for Cattleyas, Laeliocattleyas, and Odontoglossums.

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for hybrids.

Silver Banksian Medal.

To Messrs. McBean, Cooksbridge, for Cattleyas and Laeliocattleyas.

First-class Certificate.

To *Odontoglossum* × *eximium* var. 'Le Papillon' (*crispum* × *ardentissimum*) (votes unanimous), from Messrs. McBean. A large and perfectly shaped flower, white, heavily blotched with claret purple.

Award of Merit.

To *Laeliocattleya* × 'Linda' (*C. Dowiana aurea* × *L.-c.* × 'Arachne') (votes 13 for, 1 against), from Messrs. McBean. Sepals and petals salmon rose with a yellow shade. Lip rosy crimson with yellow centre.

To *Cattleya* × 'Thora' var. 'Bryndir' ('Empress Frederick' × 'Mrs. Pitt') (votes 8 for, 4 against). A compact flower with deep rose sepals and petals and purple lip with yellow lines from the base.

Other Exhibits.

Sir Jeremiah Colman, Bart.: flowers of new hybrids.
Frederick J. Hanbury, Esq.: two hybrids.
Dr. Miguel Lacroze: *Odontoglossum* × *Meredithiae*.
H. T. Pitt, Esq.: *Odontoglossum grande Pittianum*.
Mrs. Bischoffsheim: *Brassocattleya* × *Digbyano-Mendelii alba*.
Pantia Ralli, Esq.: *Laeliocattleya* × 'Maqueda,' Ashtead Park var.
Messrs. Armstrong & Brown: Odontiodas and Odontoglossums.
Messrs. Flory & Black: four hybrids.

Orchid Committee, November 5, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and seventeen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for hybrid Orchids.

Silver Banksian Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for hybrid Odontoglossums.

First-class Certificate.

To *Odontoglossum* × 'Lady Veitch' (*Hylandianum* × *Armstrongiae*) (votes unanimous), from Messrs. Armstrong & Brown. A grand hybrid and the finest of its class. Flower four and a half inches across, white, the inner two-thirds of the segments deep claret purple.

To *Brassolaeliocattleya* × 'Antoinette,' Gatton Park var. (*C.* × 'Portia' *coerulea* × *B.-l.* × 'Helen') (votes unanimous), from Sir Jeremiah Colman, Bart., Gatton Park, Surrey (gr. Mr. J. Collier). A flower of perfect shape, showing nothing of the *Brassolaelia* parent except a slight fringing on the lip. Sepals and petals bright rosy mauve, lip reddish purple with yellow disc.

Award of Merit.

To *Cattleya* × 'Eleanore' (*Warscewiczii* 'F. M. Beyrodt' × *Hardyana*) (votes 9 for, 3 against), from Baron Bruno Schroder, The Dell, Englefield Green (gr. Mr. J. E. Shill). Sepals and petals white; lip Tyrian purple with yellow base.

Other Exhibits.

Sir Jeremiah Colman, Bart.: spikes of hybrid Orchids.
C. J. Lucas, Esq.: flowers of new hybrids.
Frederick J. Hanbury, Esq.: flowers of hybrid Orchids.
J. Ansaldo, Esq.: spikes of hybrids and rare species.
Dr. Miguel Lacroze: *Brassocattleya* × 'Griselda.'
Messrs. Sanders: six specimens *Cattleya* × *Fabia alba*.

Orchid Committee, November 19, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and fifteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for hybrids and rare species.

Silver Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for hybrid Odontoglossums and Odontiodas.

First-class Certificate.

To *Sophrolaeliocattleya* × *warnhamiensis* (*S.-l-c.* × *insignis* var. 'Olive' × *L.-c.* × 'Geo. Woodhams') (votes unanimous), from C. J. Lucas, Esq., Warnham Court, Horsham (gr. Mr. Duncan). A very fine hybrid of large size and brilliant colour. Sepals and petals intense vinous purple. Lip ruby-crimson with orange-coloured base.

Award of Merit.

To *Laeliocattleya* × 'St. George' var. *illuminata* (*C.* × 'Fabia' × *L.-c.* × 'St. Gothard') (votes 10 for, 4 against), from Messrs. Charlesworth. Sepals and petals dark rosy-mauve, lip crimson with veined yellow disc.

Preliminary Commendation.

To *Odontioda* × 'Marjorie' (*Odm.* × *Alexandrae* × *Oda.* × 'Joan') (votes 12 for, 0 against), from Messrs. Charlesworth. Equal in size to the Odontoglossum parent; claret-red with white marginal lines.

To *Odontoglossum* × 'Nysa' var. 'Momus' (*eximium* × *Alexandrae*), (votes unanimous), from Messrs. Charlesworth. A fine flower with heavy claret-red blotching on white ground.

Cultural Commendation.

To Mr. Collier, gr. to Sir Jeremiah Colman, Bart., for a fine plant of *Cattleya* × 'Portia' *coerulea* with a spike of nine lavender blue flowers.

Other Exhibits.

Sir Jeremiah Colman, Bart.: hybrid Orchids.
R. Windsor Rickards, Esq.: flower of *Sophrolaeliocattleya* × 'Isabella.'
Mr. A. Fisher, Winchmore Hill: *Cypripedium* × 'Florence Fisher' (*Graceae* × *insigne* 'Harefield Hall').

Orchid Committee, December 3, 1918.

Sir Jeremiah Colman, Bart., in the Chair, and sixteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells, for a group including 225 specimens of the principal Orchids of the season.

Silver Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for Odontoglossums, Odontiodas, and Laeliocattleyas.

First-class Certificate.

To *Brassocattleya* × 'Gatton Lily' (*B.-c.* × *Digbyano-Mendelii* 'Fortuna' × *C. Trianae albens*) (votes unanimous), from Sir Jeremiah Colman, Bart. (gr. Mr. J. Collier). Flowers large and broad in all parts; pure white with a veined band of violet on the front of the lip, which has a yellow disc.

To *Cypripedium* × 'John Hartley' ('Shogun' × 'Reginald Young') (votes 8 for, 4 against), from John Hartley, Esq., The Knowle, Morley, Yorkshire. A massive flower partaking strongly of *C. insigne* 'Harefield Hall.' Dorsal sepal, pale greenish yellow with white sides and upper portion, the basal area having lines of chocolate-purple blotches. Lip and petals yellowish tinged with purple.

Award of Merit.

Laeliocattleya × 'Marshal Foch' (*L.-c.* × 'Myrrha' × *C.* × *Luegeae*) (votes 11 for), from Messrs. Charlesworth. Sepals and petals light yellowish rose; lip yellow veined with purple in front.

Laeliocattleya × 'Linda,' Bryndir var. (*L.-c.* × 'Arachne' × *Dowiana aurea*) (votes 11 for, 1 against), from Dr. Miguel Lacroze, Roehampton. Flowers rose colour with a yellow shade; lip ruby crimson with gold veining.

Preliminary Commendation.

To *Odontoglossum* × 'Rosina' (*eximium* × 'Lady Pirrie') (votes unanimous), from Messrs. Charlesworth. Flower rich claret with white margin; lip white in front, red at base.

To *Odontioda* × 'Marshal Foch' (*Charlesworthii* × *Vuylstekeae*) (votes unanimous), from Messrs. Armstrong & Brown. Flowers of fine deep claret-red.

Other Exhibits.

Sir Jeremiah Colman, Bart.: flowers of two hybrids.
Frederick J. Hanbury, Esq.: flower of *Dendrobium* × *Hanburyi* (*Dalhousieanum* × *fimbriatum oculatum*).
Messrs. Flory & Black: hybrid Orchids.
Dr. M. Lacroze: two varieties of *Laeliocattleya* × 'Linda.'
Messrs. Stuart Low: Cattleyas.
Messrs. McBean: hybrids.

NARCISSUS AND TULIP COMMITTEE.

FEBRUARY 12, 1918.

Mr. J. T. BENNETT POË, V.M.H., in the Chair, and four members present.

There were no entries on this occasion.

NARCISSUS AND TULIP COMMITTEE, FEBRUARY 26, 1918.

Mr. E. A. BOWLES, V.M.H., in the Chair, and nine members present.

Award Recommended :—

Silver-gilt Flora Medal.

To Messrs. Bath, Wisbech, for a group of Daffodils and Tulips grown in fibre in pots and bowls.

Other Exhibits.

Messrs. H. Chapman, Rye: a small group of Tulips, and seedling Daffodils derived from 'King Alfred.'

NARCISSUS AND TULIP COMMITTEE, MARCH 12, 1918.

Mr. E. A. BOWLES, V.M.H., in the Chair, and nine members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Bath, Wisbech, for Tulips grown in fibre, in pots, and Daffodils.

Silver Flora Medal.

To Messrs. Pearson, Lowdham, for Daffodils.

NARCISSUS AND TULIP COMMITTEE, MARCH 26, 1918.

Mr. E. A. BOWLES, V.M.H., in the Chair, and nine members present.

No awards were recommended on this occasion.
Mr. C. A. Jardine, Wandsworth Common, exhibited a few vases of Daffodils, and Messrs. H. Chapman a few seedling Daffodils.

NARCISSUS AND TULIP COMMITTEE, APRIL 9, 1918.

Mr. E. A. BOWLES, V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Herbert Chapman, for a group of Daffodils which included a wide range of *Poeticus* varieties.

Silver Flora Medal.

To Messrs. Barr, Covent Garden, for seedling and named varieties of Daffodils.

Bronze Banksian Medal.

To Major E. Churcher, Alverstoke, Hants, for Daffodils.

Award of Merit.

To *Narcissus* ' Jeanette ' (votes 8 for, 0 against), from Mr. W. F. M. Copeland, Shirley, Southampton. An *incomparabilis* variety (2*b*)with wide, sulphur-yellow perianth segments, and a yellow, lemon-tinted trumpet with a frilled rim. The substantial flowers are carried on stems about 18 inches high. A fine exhibition flower.

Other Exhibits.

The Rev. G. H. Engleheart, Mr. Copeland,and Mr. Jardine exhibited Daffodils.

Narcissus and Tulip Committee, April 23, 1918.

Mr. E. A. Bowles, V.M.H., in the Chair, and fourteen members present.

By the members of the Committee the Peter Barr Memorial Cup was awarded to Miss Willmott, V.M.H., Great Warley, for the year 1918–19.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Barr, for group of cut Daffodils.

Silver-gilt Banksian Medal.

To Mr. A. Robinson, Doncaster, for cut Daffodils.

Silver Flora Medal.

To Messrs. Herbert Chapman, for cut Daffodils, chiefly new varieties.

Silver Banksian Medal.

To Miss V. Warren, Westbere, Canterbury, for Daffodils.
To Mr. W. F. M. Copeland, for Daffodils.

Award of Merit.

To *Narcissus* ' Spalding Queenie ' (votes 11 for, 0 against), from Messrs. F. Culpin & Son, Spalding. A double form of *N. Poeticus ornatus.* Exhibited as a market flower. **A.M.** May 8, 1917, as a show flower.

To *Narcissus* ' Crimson Braid ' (votes 13 for, 0 against), from Messrs. Herbert Chapman. Although a three-quarter bred *Poeticus*, the variety has to be classed in the *Barrii* section. It has a finely formed white perianth and a yellow crown, with a vivid red and frilled rim.

To *Narcissus* ' Miss E. M. Bowling ' (votes unanimous), from Mr. W. B. Cranfield, Enfield. A giant Leedsii variety of perfect form and chaste beauty. Perianth segments white ; trumpet, soft apricot with pink flush.

Other Exhibits.

Major G. Churcher, Alverstoke, staged a small group of finely grown Daffodils.

The Engleheart Cup, offered for the best collection of seedling and new Daffodils not in commerce, was awarded to Mr. F. H. Chapman, Guldeford Lodge, Rye. There were four competitors.

Narcissus and Tulip Committee, May 7, 1918.

Mr. E. A. Bowles, V.M.H., in the Chair, and twelve members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Barr, for Tulips and Daffodils.

First-class Certificate.

To *Narcissus* ' Crimson Braid ' (votes 8 for), from Messrs. Herbert Chapman. In finer condition than on April 23, when **A.M.** was recommended (see above).

Award of Merit.

To *Narcissus* 'Anchorite' (votes 10 for), from Messrs. Barr. A tall-growing *bicolor Barrii* variety of large size and good form. Perianth white; cup light yellow.

Other Exhibits.

Messrs. H. Chapman: a bunch of *Narcissus poeticus* of Linnaeus, a form which was thought a few years ago to have been lost to cultivation.

Mr. W. B. Cranfield: a few seedling Daffodils.

NARCISSUS AND TULIP COMMITTEE, MAY 28, 1918.

Mr. E. A. BOWLES, V.M.H., in the Chair, and seven members present.

There were no entries on this date.

GENERAL EXAMINATION IN HORTICULTURE.

March 20, 1918.

Seniors.

One hundred and thirty-four candidates entered for the Society's General Examination for Seniors held on March 20, 1918. Four were absent, and eleven were not placed.

The Examiners, the Rev. Prof. G. Henslow, M.A., V.M.H., and Mr. James Hudson, V.M.H., report that of the candidates there were none whose papers were of sufficient merit to warrant a place in the First Class; 11, or 8 per cent., were placed in the Second Class, and 108, or 80 per cent., in the Third Class.

In Section A (Principles), a large number of candidates answered fairly well the first two questions dealing with the nature of the soil, and with the importance of light, their significance in cultivation being understood.

In Section B (Operations and Practice), those questions having a bearing on practical work were, on the whole, well understood.

Juniors.

Twenty-five candidates entered for the Juniors' Examination, and of these three secured a Second Class, four a Third, and nine a Fourth Class.

Now that the teaching of gardening is to be given a more prominent place in the country's educational curriculum, and special provisions for it are made in the new Education Act, it is hoped that in future years there will be a very large number of entries of the elder school boys and girls for this examination. Anyone of seventeen years of age and under can enter for it.

April 30, 1918. W. Wilks, *Secretary.*

Seniors.

Class 2.

1. { Johns, Thos. D., Cartref, Bryn Road, Tondu, Bridgend.
   Rogerson, Violet C., Aldersey Hall College, Chester.
3. Angall, Audrey, Studley College, Warwickshire.
4. Hazell, Margaret, Thatcham Fruit and Flower Farm, Newbury.
5. { Daltry, Phyllis, Thatcham Fruit and Flower Farm, Newbury.
   Twigg, Beatrice B., Thatcham Fruit and Flower Farm, Newbury.
   Willett, Dorothy, Thatcham Fruit and Flower Farm, Newbury.
8. { Cole, W. E., Dyrham, Staple Hill, Bristol.
   Jeffries, Dorothy I., Studley College, Warwickshire.
10. { Epps, Mary T., School of Gardening, Clapham, Worthing.
   Swiffen, Doris, Studley College, Warwickshire.

Class 3.

1. Bigger, Florence A., Irish School of Gardening, Terenure, Dublin.
Carden, Catherine C., Thatcham Fruit and Flower Farm.
Hare, Katharine C., 2 Gonville Place, Cambridge.
Tazewell, Kathleen M., St. James' Gardens, West Malvern.

5. Barton, Sibyl M., The Grange, Grinshill, Shrewsbury.
Danvers, Ernest, Leicester Road, Shepsted, Leicestershire.
Epps, Laura, 3 Cecil House, High Street, Marylebone, W.
Fidler, A. S., 3 Cresselly Villas, Mountain Ash, Glam.
Godfrey, Elsie M., Huntsmoor Park, Iver, Bucks.
Watts, Marjorie E., Aldersey Hall College, Chester.
Whittaker, Gladys E., Studley College, Warwickshire.
Wilson, Evelyn F., The Grange, Grinshill, Shrewsbury.

13. Forrest, Kathleen L., 34 Glenmore Road, Oxton, Birkenhead.
Gwynn, Sheila, Irish School of Gardening, Terenure, Dublin.
Osman, Elinor J., Nantyderry House, Abergavenny.
Reeves, Florence E., The Homestead, Meopham.
Rose, William W., 16 Oakeys Cottages, West Stanley, Co. Durham.

18. Hebditch, G. L., Fair View, Botleys, Chertsey.
Humphry, Doris N., Studley College, Warwickshire.
Leonard, Margaret M., Studley College, Warwickshire.
Notley, Eileen I., The Homestead, Meopham.
Phelp, Isabella M., Rotherfield, Tunbridge Wells.
Weatherhead, E. L., Harborne, Sydenham Road, South, Cheltenham.

24. Daws, Holly, 690 Fishponds Road, Bristol.
Duncan, Pamela M. C., Huntsmoor Park, Iver, Bucks.
Humphreys, 2nd Lieut., G.A.V., 5th Army Convalescent Depot, B.E.F., France.
Janes, Richard W., 61 Stanley Road, Wellingborough.
Morton, Sylvia, St. James' Gardens, West Malvern.
Shaw, J. H. St. J., Lindau, Balmoral Road, Parkestone.
Steed, Margaret C., Lanherne House, Dawlish.
Wuyts, Oscar, 79 Flood Street, Chelsea, S.W.

32. Carter, Winifred M., Studley College, Warwickshire.
Fleming, Marjorie, Thatcham Fruit and Flower Farm, Newbury.
Gosselin, Eileen, 2 Melrose Place, Clifton, Bristol.
Kerley, Lily, Ballingale, Ballycarney, Ferns, Co. Wexford.
O'Grady, Eileen McMahon, Thatcham Fruit and Flower Farm.
Platten, Edward W., Beech Terrace, Needham Market.
Scott, Violet, The Yellow House, Buckland, Betchworth.
Surman, Nellie, Stainmore, Newport, Mon.

40. Creswell, E. Grace, University College, Reading.
Spurway, Gertrude A., Barnacre Lodge Gardens, Garstang.
Kirkpatrick, Sybil, Irish School of Gardening, Dublin.
Tillie, Joy, Thatcham Fruit and Flower Farm, Newbury.

44. Anderson, Mabel E. S., Ingol Lodge, nr. Preston.
Bond, M. F., St. James' Gardens, West Malvern.
Davis, Winifred M., Little Stoke, Patchway, Bristol.
Lancaster, Annie, 3 Abel Street, Burnley.

48. Bond, Elsie M., 30 Brook Green, Hammersmith, W. 6.
Cadbury, I. D., St. James' Gardens, West Malvern.
Christie, Josephine M., East Farm, Affpuddle, Dorchester.
Corbett, Eleanor M., 84 High Street, Bromsgrove.
Deane, Elsie M., Irish School of Gardening, Dublin.
Elder, Margaret M., Slogarie, Mossdale, Kirkcudbrightshire.
Gorman, Flora, Irish School of Gardening, Dublin.
Martin, Winifred J., Whitelands, Iwerne Minster, Blandford.
Tayler, Frieda, Studley College, Warwickshire.
Willis, Marion I., St. Clair, Hillside, Barming, Maidstone.

58. Barker, Lilian Harvey, 116 Park Road, Peterborough.
Knowles, Mary, 80 Lomeshaye Road, Nelson, Lancs.
McMurdo, Phyllis, 179 Rathgar Road, Dublin.
Veendorp, Hesso, 1 Stockmore Street, Cowley Road, Oxford.

62. Jones, Owain E., Anghorfa, Ystradgynlais, Breconshire.
Merry, Sarah K., Bourton Hall Gardens, Rugby.
Newstead, Constance M. I., Studley College, Warwickshire.

65. Gordon, Violet, St. James' Gardens, West Malvern.
Harris, Nora, 87 Dyne Road, Brondesbury, N.W. 6.
Hutchinson, James, North Hayleazes, Keenley, Allendale.
Moran, John J., Mount Bellew, Co. Galway.

69. Carr, Constance, Studley College, Warwickshire.
Fox, Mary V., Brookfield, Milltown, Co. Dublin.
Higson, James H., 28 Fernlea Road, Seaforth, nr. Liverpool.
Stamp, Arthur E., Ross Cottage, Eastworth Road, Chertsey.

73. Alexander, Gladys H. M., Colamore Lodge, Dalkey, Dublin.
Betbeder, Mrs. B., 12 Kenbury Mansions, Coldharbour Lane, S.E. 5.
Constantine, Minnie F., 2 and 4 Marlboro Street, Burnley.
Merry, Grace L., 7 Ombersley Road, Droitwich.
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3. Cattee, Mary, 5 Market Square, Ebbw Vale, Mon.
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3. Wigan, John, Industrial School, Lostock, Bolton.

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EXAMINATION OF SCHOOL TEACHERS IN COTTAGE AND ALLOTMENT GARDENING.

April 17, 1918.

Eight Hundred and Eighty-seven candidates entered for the Examination held on April 17, 1918. Of these, 19 obtained a first class, 241 a second, and 404 a third, leaving 182 failures and 41 absentees.

The Examiners, Mr. F. J. Chittenden, F.L.S., V.M.H., Mr. W. Crump, V.M.H., Mr. C. R. Fielder, V.M.H., and Mr. John Fraser, F.L.S., report that the candidates' written answers were somewhat disappointing, considering their profession. There appears considerable carelessness in reading and answering the questions. The questions were carefully prepared, with the view of getting the candidates to think; the answers, however, were mostly text-book phrases, or sentences repeated from the R.H.S. Pamphlets; there was often no evidence of originality or study or of intelligence. On the other hand, there was a certain proportion of excellent and well-written papers.

Question 1, on the cultivation of derelict land for potatos, was fairly well understood.

Question 5 asked for eight *kinds* of hardy fruit, *not* for eight *varieties*. This distinction was frequently ignored. Increased opportunities are evidently needed for candidates to attend courses of practical work.

Question 6.—Many failed to grasp the meaning of this question; the vegetables should have been dealt with separately instead of in groups, as each one varies from all the others in some of its requirements. Some confusion arose about spring cabbage, which several competitors imagined referred to spring sowing instead of being ready to use in the spring. Coleworts and Kale were not well known to many. Many of the answers to this question were very good indeed, and some very good diagrams of trenching were included.

Question 7 was very well done on the whole, the selection of plants was in most cases good; but some of the candidates gave too many examples for spring at the expense of the rest of the year. Some of them did not indicate their relative values for cutting purposes.

The object of Question 8 was to test candidates' practical knowledge of the essential plant-foods and their intelligent application to crops. A few of the answers were good and showed a practical knowledge of the subject, but the majority were disappointing; for although a large number of the candidates showed a fair knowledge of plant-foods and of the manures which supply them, many failed to name suitable manures for the several crops, and particularly the quantities to be applied. As in previous years, the text-book was very much in evidence. In view of the fact, however, that many of the candidates live in large towns, where opportunities of gaining a practical knowledge of gardening are—or until the last year or two were—very restricted, this, although much to be regretted, is perhaps not easily avoided.

Question 9.—The treatment of fruit-bushes was imperfectly understood. Many grouped the various kinds together, such as Black Currants and Raspberries, or Red Currants and Gooseberries, and thus failed to do full justice to any of them. A few good diagrams were given, and a small proportion of the answers were good.

Question 10 was not well answered. In many cases there was no description or proper comparison, and in very few instances was a distinction made between the tuberous *stem*-tuber of the potato and the *root*-tuber of the Dahlia, both being given as examples of stem-tubers. The corm was rarely correctly described.

In Section B the answers were very unequal in value, and many candidates read the questions so carelessly that their replies were quite irrelevant. For instance, Question 11 asked how adequate supplies of air, heat, and moisture could be secured to seeds for germination. Yet some told how an adequate supply of seeds for next season's sowing might be obtained ; others wrote of developing plants instead of seeds ; some put seeds into a dark cupboard in order to deprive them of air ; several " mulched with liquid manure " ; not a few told how seeds shrivel or wither in a dry jar ! Answers given to other questions were often similarly at fault.

Candidates would do well to remember that the Examiners require direct answers to the questions asked, instead of writing around a particular point.

Generally speaking, while in a few cases answers were good, the Examiners feel that either the scientific principles underlying gardening are as a rule ill-taught, or that candidates estimate far too lightly the study necessary to grasp these principles.

W. WILKS, *Secretary.*

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TEACHERS' EXAMINATION IN HORTICULTURE.

HELD BY THE SOCIETY AT THE INVITATION OF THE GLAMORGAN COUNTY COUNCIL, SEPTEMBER 21, 1918.

NINETY-FIVE candidates entered for this Examination. Of these 6 obtained a first class, 22 a second, and 38 a third class, leaving 15 failures and 14 who did not sit.

Section A.

The Examiners (Mr. F. J. Chittenden, F.L.S., V.M.H., and Mr. C. R. Fielder, V.M.H.) report that almost every candidate attempted Questions 1, 2, 3, and 4, the majority of the answers being fairly good, although in Question 1 some candidates confused Trenching with Ridging, and Double Digging with Trenching, while not a few omitted to give the width of the trenches—a serious omission, as upon this greatly depends the satisfactory performance of the work.

In Question 3 many candidates missed the important point that the nitrogen taken from the soil by "Green Manuring" is prevented from being washed away by rain and stored up in the plants for returning to the ground.

Although the work was again fair in Questions 5, 6, 7, and 9, there was a much smaller number of answers—only ten in Question 7 and two in Question 9. This leads to the inference that candidates have confined their studies chiefly to vegetable cultivation and the production of the maximum amount of food. Nevertheless, the importance of fruit as food should not be lost sight of, as the return to peace conditions will require that the teaching of fruit cultivation shall go hand in hand with the cultivation of vegetables.

In Question 8 not a few candidates included Wallflowers and Antirrhinums amongst biennial plants, and Lobelia amongst annuals, which suggests lack of observation. A curiously small number included any of the woody flowering plants in their lists of perennials, omitting such typical cottage garden plants as Roses, Lilacs, Jasmine, etc.

There were some good answers to Question 10, but many were lacking in necessary details.

Throughout Section A generally many answers were too brief, and failed to illustrate adequately the candidates' knowledge of the subjects.

Section B.

Few of the answers given in Section B were really well done. They savoured too much of replies "got up" for Examination purposes instead of being based upon sound knowledge of principles.

Many candidates hopelessly mixed up the common potato disease with the potato wart disease. Scarcely any attached importance to getting seed true to the variety it purported to be and of a really good stock, two points at least as important as good germination. While nearly all who attempted Question 13 realized the importance of light in connexion with the development of chlorophyll, but few grasped its importance as a source of energy—the cardinal fact in food-making in the green leaf.

W. Wilks, *Secretary.*

Approved by the
R.H.S. Board of Examiners,
November 12, 1918.

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4. Rees, R., Parc-y-deri, Three Crosses, Dunvant.
5. Wilde, Miss G., 245 Barry Road, Barry Dock.
6. Thomas, D., 15 Rhys Street, Trelaw.

Class 2.

7. { Davis, P. E., Brynteg, Abergwynfi.
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9. Brown, J. W. T., Plas Bach, Coity.
10. Kemp, Miss K., 21 Wenvoe Terrace, Barry.
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15. Williams, H. B., 12 Mackintosh Road, Pontypridd.
16. { Williams, Miss C., School House, Llantrithyd.
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18. Williams, J. E., Maes-yr-haf, Pontlottyn.
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ESTABLISHED
1804.

INCORPORATED
1809.

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ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W. 1.

NOTICES TO FELLOWS.

I. IMPORTANT NOTICES.

1. The Society's Hall in Vincent Square being still occupied by the Australian Imperial Force, the Fortnightly Meetings continue to be held in the London Scottish Drill Hall, Buckingham Gate, Victoria Street. It is hoped that Fellows will do their utmost to support these Meetings during their temporary transference to the Drill Hall.

2. The Lectures will be given at the Drill Hall.

3. The Society's Offices and Library continue in Vincent Square as heretofore. The Scientific Committee also meets as before at Vincent Square.

2. SUBSCRIPTIONS.

All annual subscriptions are payable in advance on the 1st day of January in each year. A Fellow, if elected before the 1st of July, pays the annual subscription for the current year; if elected after the 1st of July and before the 1st of October, he pays half a year's subscription; if elected after the 1st of October and before the 1st of January, he pays one full year's subscription, and no further subscription until the following January twelvemonth. To avoid the inconvenience of remembering their subscriptions, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1. It may be a week or more before the Tickets reach the Fellows, owing to the very large number (over 20,000) to be despatched every January. Fellows who have not already given an order on their bankers for the payment of their subscriptions are requested to do so, as this method of payment saves the Fellows considerable trouble. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas, and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society," and crossed "London County and Westminster Bank, Victoria Branch, S.W. 1."

3. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £ to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty within six months of my decease; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

4. NEW FELLOWS.

The President and Council hope that existing Fellows will enlist the sympathy of all their friends, as, owing to the great increase in work which has fallen upon, or been voluntarily undertaken by, the Society, it is now more important than ever to fill the places of those who are taken from us. The annual revenue of the Society is nearly £10,000 less to-day than it was five years ago, and if the work is to be carried on successfully it is most important that this loss should be made good without delay.

5. AN APPEAL.

What has been accomplished for the Society is largely due to the unwearied assistance afforded by the Fellows themselves, and as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially by :—

1. Increasing the Number of Fellows.
2. Presenting Books for the Library at Vincent Square and at Wisley.
3. Sending new or rare Plants, Seeds, and Roots for the Garden and for distribution to Fellows.

6. THE SOCIETY'S GARDENS AT WISLEY.

The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets, from 9 A.M. till 6 P.M., except on Sundays, Good Friday, Christmas Day, and Meeting Days. Each Fellow's Ticket admits three to the Gardens. The Public are not admitted at any time.

The Gardens are about 3½ miles from Byfleet, 3½ miles from Horsley, and 5½ miles from Weybridge, all on the South-Western Railway. Carriages to convey

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* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

The attention of Fellows is specially called to the Wisley Gardens Endowment Trust Fund, the object of which is to make the Gardens self-supporting for ever, so that the important work to which they are devoted may go on uninterrupted by any fluctuation in the Society's finances. To do this £100,000 is required. In 1914 the Council voted £25,000 towards it as a nucleus. Will not Fellows help to complete this sum ?

four persons can be obtained by writing to Mr. D. White, fly proprietor, Ripley, Surrey ; or motor cars can be had at Byfleet Station by applying to Mr. Finch, or Mr. Howard, Byfleet, Surrey. Accommodation and refreshments can be had at the Hut Hotel close to the Gardens, and also at the Hautboy, Ockham.

All communications to the Gardens should be addressed to "The Director" R.H.S. Gardens, Wisley, Ripley, Surrey.

7. STUDENTS AT WISLEY.

The Society admits young men, between the ages of sixteen and twenty-two years, to study Gardening at Wisley. The curriculum includes not only practical garden work in all the main branches of Gardening, but also Lectures, Demonstrations, and Horticultural Science in the Laboratory, whereby a practical knowledge of Garden Chemistry, Biology, &c., may be obtained.

8. DISTRIBUTION OF SURPLUS PLANTS.

Some years ago the Council drew attention to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock, which must either be given away or go to the waste-heap. A few Fellows, noticing this, asked for plants which would otherwise be discarded ; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematize this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive those surplus plants ? It was, therefore, decided to keep all plants till the early spring, and then give all Fellows who had paid the current year's subscriptions the option of claiming a share of them by Ballot.

Fellows are, therefore, particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution is permitted. The great majority also are, of necessity, *very small*, and may require careful treatment for a time.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the "Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot ; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is, therefore, obvious that when the Ballot is kind to any Fellow he will receive the majority of the plants he has selected, but when the Ballot has given him an unfavourable place he may find the stock of almost all the plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in a similar way. Fellows having omitted to return their application form before April 30 must be content to wait till the next year's distribution. The work of the Garden cannot be disorganized by the sending out of plants at any later time in the year. All Fellows who have paid the current year's subscription can participate in the annual distribution *following* their election.

The Society does not pay the cost of packing and carriage. Owing to the railways declining to deliver these parcels any longer, they *must* now be sent by post, the postage being prepaid by Fellows. Directions as to the amount of the remittance to be sent will be found on the application form for plants, which kindly consult before sending it in.

Parcels will be addressed exactly as given by each Fellow on the address label accompanying his application form.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom.

No plants will be sent to Fellows whose subscriptions are in arrear, or who do not fill up their forms properly.

9. A NATIONAL DIPLOMA IN HORTICULTURE.

Most gardeners have welcomed the initiation by the Society of a scheme whereby a National Diploma in Horticulture may be gained by those who pass the Preliminary and Final Examinations. The Diploma is thoroughly "National," for, by the consent of H.M. Government, the Department of Agriculture consented to co-operate with the Society if the Society would undertake the work of organizing the Examinations, and authorized the Diploma bearing the following words: "Awarded by the Royal Horticultural Society under a scheme approved by the Board of Agriculture."

In 1919 the Examinations will be held in September, and include practical, *viva voce*, and written parts; the practical part will be held in a suitable garden.

Information may be obtained by sending a directed envelope, stamped, to the Secretary, Royal Horticultural Society, Vincent Square, S.W. 1.

10. EXAMINATIONS, 1919.

The revised syllabus of the different examinations can be obtained from the Society's Office, Vincent Square, S.W. 1, post free for 1½*d.*

11. INFORMATION.

Fellows may obtain information and advice from the Society as to the names of flowers and fruits, on points of practice, insect and fungus attacks, and other questions, by applying to the Secretary, R.H.S., Vincent Square, Westminster, S.W. 1.* Where at all practicable it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the fortnightly Meetings, so as to be laid before the Scientific or other Committees at once.

12. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost, viz.: a fee of £3 3*s.* for one day (or £5 5*s.* for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their Gardens. Gardens can only be inspected at the *written* request of the *owner.*

13. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many branches of the Society's work is the affiliation of local Horticultural Societies to the R.H.S.

Numerous requests for help having recently reached the Secretary from the Allotment and Cottagers' Societies which have sprung up all over the Kingdom, the President and Council have responded by revising and extending the benefits offered to Affiliated Societies. It is hoped that all Societies will by Affiliation become united with the parent Society and through it with each other. Such a unity cannot fail to be attended with good and progressive results.

14. R.H.S. GARDENERS' DIARY.

The R.H.S. Gardeners' Diary for 1919 contains a considerable quantity of new information and is compiled more especially for the single-handed gardener. Fellows may obtain it from the R.H.S. Office, Vincent Square, London, S.W. 1; bound in imitation leather, 2*s.* over the counter, 2*s.* 3*d.* post free.

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* *See* R.H.S. Gardeners' Diary—"How to send Specimens for Identification."

15. RULES FOR JUDGING—1914 CODE.

The "Rules for Judging, with Suggestions to Schedule Makers and Exhibitors," have been revised. Secretaries of Local Societies are advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1*s.* 9*d.*, addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W. 1.

16. R.H.S. FOOD PRODUCTION PUBLICATIONS FOR THE ASSISTANCE OF COTTAGE AND ALLOTMENT GARDEN SOCIETIES.

To assist Allotment Holders and Cottage Gardeners the Society has had the following publications prepared :—

	Post free. *s.* *d.*
Rules and Regulations for Allotment Societies	2
Rules for Judging Cottage and Allotment Gardens	2
Companion Judges Sheet for ditto	3
Rules for Allotment and Vegetable Exhibitions	2
Vegetable Bottling and Fruit Preserving without Sugar, by Mr. and Mrs. Banks (including valuable recipes for Jams and Jellies) . . .	1 8

Printed lectures, illustrated with lantern slides, have been prepared for the use of Societies of Allotment Holders. For particulars apply to the Secretary, R.H.S., Vincent Square, S.W. 1.

17. R.H.S. POPULAR PRACTICAL PAMPHLETS.

The following pamphlets can be ordered from the Royal Horticultural Society, Vincent Square, London, S.W. 1. They will be found eminently practical and useful. The enormous increase in the cost of paper and printing has necessitated a revision of the price of these Pamphlets, which until further notice will be 6*d.* each, or by post 7*d.*

FOOD PAMPHLETS :—

(*e*) Vegetables and How to Grow Them.
(*f*) Vegetables from Seed sown in July and August.
(*q*) The Cultivation and Manuring of the Garden.
(*r*) Potatos in Gardens and Allotments.
(*w*) Potato Growing—Spring work.
(*x*) Potato Growing—Autumn work.
(*y*) Potato Growing, Some Experiments in.
(*v*) Cropping Allotments and Small Gardens.
(*a*) List of Hardy Fruits, with Cultivation.
(*c*) The Pruning of Fruit Trees.
(*b*) The Training of Fruit Trees.
(*d*) Keeping Fruit Trees Clean.
(*k*) Fruit and Vegetable Bottling and Storing.
(*m*) Vegetable Cookery.
(*n*) Salads and Salad Making.

OTHER GARDEN PAMPHLETS :—

(*g*) The Herbaceous Garden.
(*h*) The Rose Garden.
(*i*) Flowers for Small Gardens, Window Boxes, &c.
(*j*) Hardy and Half-Hardy Annuals in the Open Air.
(*o*) War-time Economy in Gardening.
(*p*) Medicinal Plants and their Cultivation.
(*s*) Fruit Cultivation under Glass.
(*t*) The Pruning of Hardy Shrubs.
(*u*) The Children's Garden.

500,000 of these Pamphlets have been sent out since 1915.

18. LIST OF THE MOST DESIRABLE VARIETIES OF FRUIT.

DRAWN UP BY THE FRUIT COMMITTEE.

Price 2*s*. post free. It contains nearly 200 pages, and besides the original list drawn up by the Committee, it gives lists of varieties recommended by nearly 100 expert growers and gardeners all over the country for their respective geographical divisions of Great Britain. The list shows the result of a ballot as to which varieties are to be preferred from such points of view as vigour of constitution, and for various types of growth and cultivation, as, *e.g.*, in the case of Apples—Bush, Standard, Espalier ; Pears—Bush, Standard, Espalier, Wall. It also shows the best varieties for cooking as distinct from dessert, the best for markets, and much similar detailed information which must prove of great help in these days when the desirability of the planting of more fruits is so widely recognized.

19. FREE LEAFLETS.

The following leaflets may be had free on receipt of a ½*d*. stamped addressed envelope :

Fruit Bottling for Cottagers.
Lady Carbery's Recipe for Preserving Fruits.
R.H.S. Dutch Brown Beans.
The Cultivation of Beans for Winter Consumption.
A List of R.H.S. Gardening Charts for Societies and Schools.
Butterfly Competitions.

20. BOOK ON FRUIT AND VEGETABLE BOTTLING.

Fellows of the Society have shown exceptional interest in the long series of lectures given at the Fortnightly Meetings by Mr. and Mrs. Vincent Banks on Fruit and Vegetable Bottling, who have now, in response to many requests, prepared a book on the subject. The Council, recognizing the value of the information it contains, and the demand for instruction of this kind, have published it. It contains the most up-to-date information on the subject and is most practical. It deals not only with the Bottling of both Fruits and Vegetables, but also with the making of Jam, and the pulping of Fruit to be made into Jam later on, when sugar supplies are more abundant. There are also many useful household recipes, and all the information given is the result of the actual experience of the authors extending over a long number of years. Mr. and Mrs. Banks' exhibits of Bottled Fruits at the Society's Meetings are well known to the Fellows for their excellence. The price of the 1918 revised edition, which may be obtained from the R.H.S., Vincent Square, London, S.W. 1, is 1*s*. 6*d*. over the counter, or post free 1*s*. 8*d*. ; bound in stiff paper covers.

21. R.H.S. WAR RELIEF FUND.

The work of the Society having greatly increased since the outbreak of the War and the staff having greatly diminished, the Council found that the management of this fund imposed far too great a demand upon the staff, a demand indeed which it was impossible to meet. A special Administrative Committee for the War Relief Fund was, therefore, appointed. The Committee is composed of Members of the Council, and of the Ladies' Executive Committee which has done such admirable work in collecting money for the fund. The Office of the Fund is at 17 Victoria Street, Westminster, S.W. 1, where all communications and donations should be addressed.

22. GARDEN CHARTS.

The Society has been engaged for some months past preparing a series of large garden charts. The following are now ready, and can be had from the Society's Office, Vincent Square, Westminster, price 3*s*. 6*d*. each, viz. :—

Series I.—INSECTS.

Chart 5. American Blight.
6. Magpie Moth.
8. Destructive Caterpillars—Yellow Underwing, Turnip Moth, and Cabbage Moth.

Chart 13. Big Bud on Black Currant.
14. Mussel Scale.
15. Apple Saw-fly.
16. Lackey Moth.

Series 2.—FUNGUS PESTS.

Chart 1. Apple and Pear Scab.
3. Brown Rot.

Chart 8. Potatos; Wart, Brown Scab, and Corky Scab.
9. Silver Leaf.

Series 3.—DIGGING.

Chart 1. Double Digging.

Series 4.—VEGETABLE GROWING.

Chart 1. Preparing the Ground.
2., 3. Seed Growing.
4. Onion Growing.
5. Cabbage Planting.
6. Celery Growing.

Chart 7. Staking.
8. Potato Growing. Sprouting and Cutting.
9. Potato Growing: Processes in.

Series 6.—STORING.

Chart 1. Potato, &c., Clamping.

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The references in italics are to figures and illustrations.

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