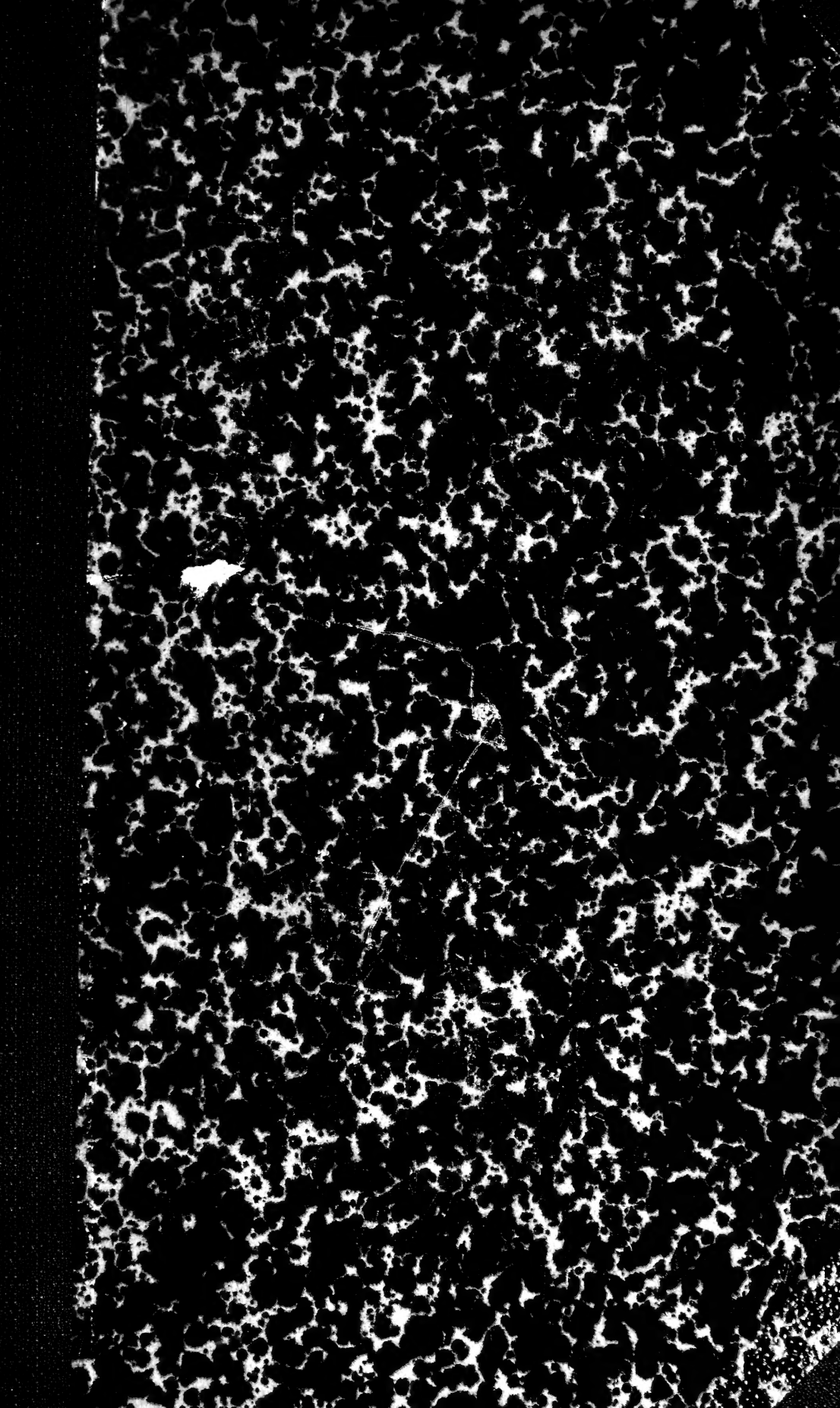

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JOURNAL

OF THE

ROYAL HORTICULTURAL SOCIETY.

VOL. XXVIII. 1903.

PARTS I. AND II.

PESTS OF ORCHARD AND FRUIT GARDEN.

By M. C. COOKE, M.A., LL.D., A.L.S., F.R.H.S., V.M.H.

FRUIT-GROWERS will find indicated in the following pages most of the pests which are likely to trouble them in their occupation. The arrangement is rather an artificial one, but it appeared to be best suited to the wants of practical men. Orchard trees will occupy the first portion, whilst the latter will be assigned to bushy and herbaceous plants with marketable fruits. Anomalies may be sometimes anticipated, as, for instance, placing Melons with Gourds and Cucumbers in the kitchen garden, and Tomatos in juxtaposition with Potatos. The Grape Vine and Pineapple, and similar tropical fruits, will have to be dealt with by themselves.

APPLE-LEAF SPOT.

Septoria pyricola (Desm.), Pl. X. fig. 1.

Spotted leaves are common enough in the orchard and elsewhere, but they may have many causes, known and unknown, and cannot all be attributed either to insects or fungi. In most cases the spots on the leaves, although destructive to the leaf, unless very prevalent do not affect materially the general condition of the tree or the production of fruit, except in a few instances of a virulent kind.

In the present instance the spots occur on the upper surface of the leaves of Apple or Pear, and are of a greyish-white with a narrow brown margin. They are commonly somewhat rounded, from a quarter of an inch in diameter. The substance within the spot is killed by the mycelium and bleached, with the surface sprinkled or dotted with little black points not larger than the prick of a pin. Each of these points

consists of a small nearly globose receptacle with a minute pore at the apex which encloses the fruit, or spores, of the fungus. When fully mature these minute sporules ooze out at the orifice in the form of a tendril and spread over the surface of the leaf.

The sporules in the present species are elongated and threadlike, with about two transverse divisions (60 × 3½ μ) of a very pale olive tint.

Found generally throughout Europe.

Sacc. Syll. iii. 2624; *Cooke Hdbk.* No. 1320; *Seem. Journ.* iv. f. 27.

A large leaf-spot (*Phyllosticta pyrorum*) is known in the United States, with much smaller sporules (10 × 2 μ).

Apple-leaf Black Mould.

Coniothecium Questieri (Desm.).

This mould was first discovered in France nearly half a century ago on leaves of *Cornus*, and has appeared this season (1902) on fading leaves of Apple, although we have grave doubts of its being any other than a saprophyte. It occurs on the under surface of completely dead spots of the leaves, or on thoroughly dead and brittle leaves. The tufts are small and scattered in little black dots over the dead parts, but do not occur upon the merely discoloured and fading leaves.

The conidia are conglomerated in variously shaped clusters of from two to eight cells (about 10 μ diam.), of a pale brownish colour, mixed with occasional slender threads.

Sacc. Syll. iv. 2442; *Trans. Br. Myc. Soc.* (1903), p. 15.

Apple-tree White Mould.

Oidium farinosum (Cooke), Pl. X. fig. 2.

This mould was first observed in 1870 and 1871 covering the young twigs and leaves of Apple trees with a mealy coating of white mould, so that they looked as if dusted with flour or powdered chalk. Since the above it has become sufficiently common. Although it is a true epiphyte, it is capable of inflicting injury, causing the young leaves to curl, checking their growth, and distorting the tender twigs.

There is a thin and delicate but profuse mycelium from which arise the fertile branches, which are club-shaped and divided by transverse septa into short joints, which gradually contract at the suture, and then the top joint having acquired an elliptical form falls away as a conidium, to be followed successively by the other joints, so that a continuous crop of mature conidia is ensured. They are externally quite smooth and colourless (28–30 × 12 μ).

The habit and structure of this mould are quite similar to the *Oidium* of the vine, that which precedes the Rose mildew, and the development of the different species of *Erysiphe*.

In 1890 this mould made its appearance on Apple trees in South Africa, and possibly it is the same species as one which is common east of the Mississippi in the United States.

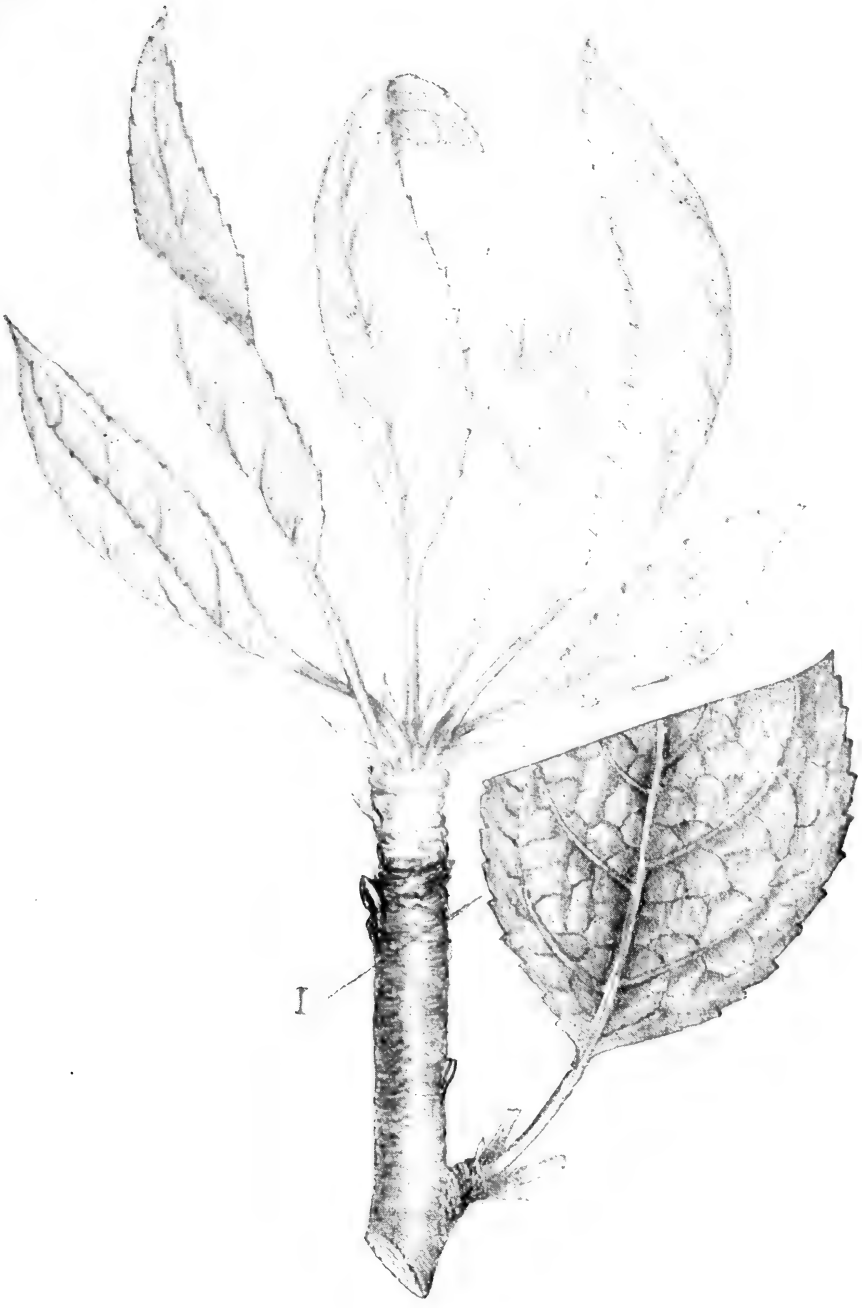


Fig. 1.—Apple Mildew (*Sphærotheca mali*).

As the mycelium of the fungus appears to be perennial in the tissues, diseased shoots should be removed along the line marked I. Spraying does not check this disease. The point affected should be all cut away.

In such cases dusting with dry sulphur is likely to be the most effectual treatment. In America the application of the ammoniacal solution of carbonate of copper is recommended.

Grevillea, xvi. 10.

Apple-twig White Mildew.

Sphærotheca mali (Duby).

A century ago one of the fungi closely allied to that of the Rose and the Hop was imperfectly described in France under the name of *Erysiphe mali*, but very recently it has been revived by Dr. Magnus, who has seen and figured one of the conceptacles. It was said to be broadly effused; the thin arachnoid threads of the mycelium interwoven; the conceptacles rare, and scattered, subglobose, rugulose, and black.

The mould already described here under the name of *Oidium farinosum* appears to be the mycelium and conidia of the above fungus, but at present the more perfect and complete condition with the conceptacles has not been met with in this country. In this instance we appear to have a "perennial mycelium in the host plant, which grows along with the shoot each season, stunting its growth and eventually killing the tree." (Fig. 1.)

Journ. R.H.S. (1902), xxvi. p. 737, fig. 310; *Duby, Bot. Gall.* 869.

Fruit-tree Pustule.

Eutypella prunastri (Pers.).

This compound *Sphæria* is only parasitic in the early stage, when spermogonia are evolved in tendrils through punctures of the bark. No one has seen the complete or true *Eutypella* stage, except on dead tissues. In this condition the perithecia are clustered together in definite pustules, some five or six, with long converging necks, which are sulcate or grooved at the extremity or ostiolum. The fructification is contained within the perithecia, consisting of eight sporidia, enclosed within a transparent ascus, of which there are several. The sporidia are cylindrical, curved, and but slightly coloured (6–8 × $1\frac{1}{2}$ μ).

The spermogonia, which are developed earlier, ooze out in tendrils from the mouths of the receptacles, and are known in this stage under the name of *Cytispora rubescens*: they are not more than half the length of the conidia. It is reported that this is a wound parasite, and enters the stem through wounds made by pruning, finally causing discoloration in the centre of the stem (see figs. 2 and 3). The trees will continue to grow for several years after infection.

Destructive to Apple and other fruit trees, especially Plum and Cherry.

Sacc. Syll. i. 566; *Cooke Hdbk.* No. 2460; *Journ. R.H.S.* (1902), xxvi. p. 712, fig. 313; *Ibid.* xxvii. pp. 691, 936, 1152; *Gard. Chron.* 1902, p. 235, fig. 80; *Berlese Icon.* iii. pl. 85.

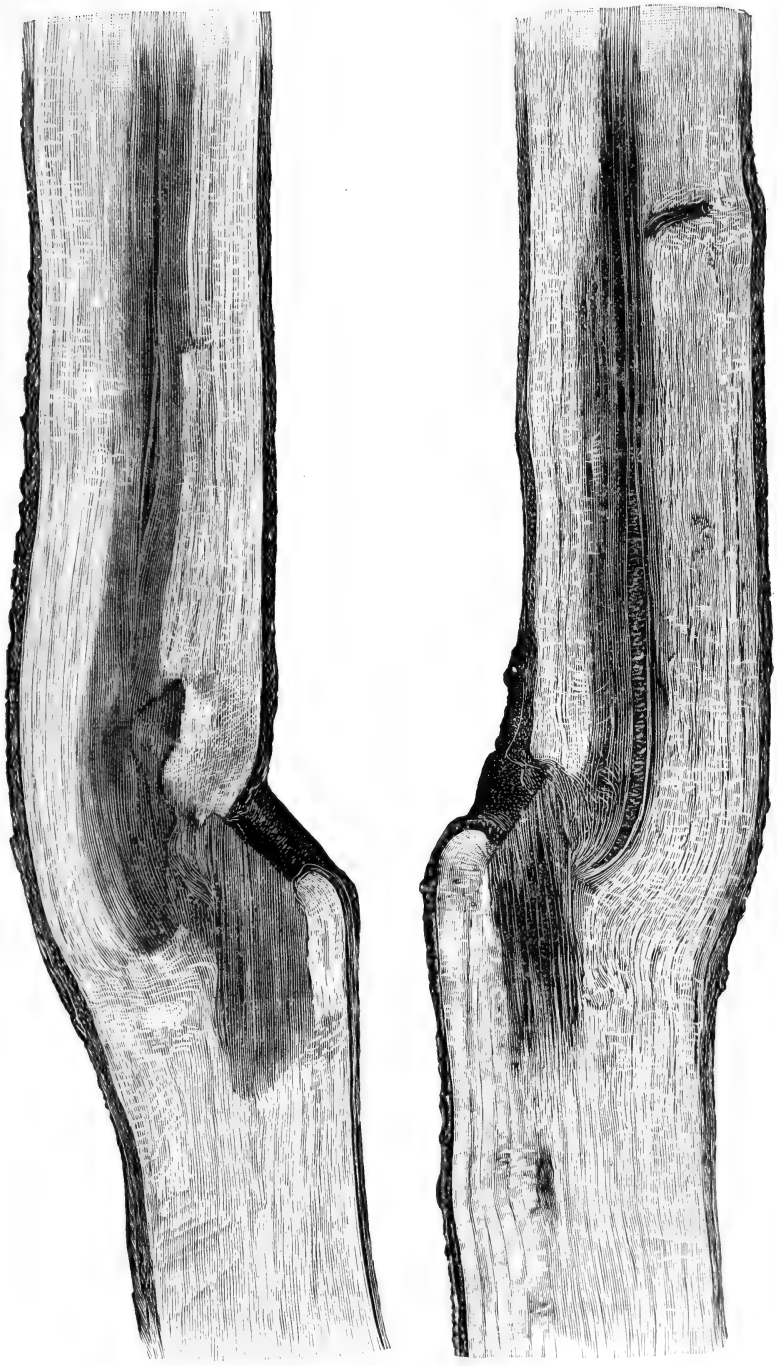


FIG. 2.—EUTYPELLA PRUNASTRI.

Brown Rot.

Monilia fructigena (Pers.), Pl. X. fig. 12.

This rot is not confined to the Apple and Pear, but attacks most orchard fruits, especially the Cherry, to which we shall refer it later on. (See "Apricot Brown Rot.")

Thüm. Pom. p. 22; *Journ. R.H.S.* (1902), p. 738, fig. 311.

Fruit Spot.

Septoria Ralfsii (Berk.).

About the year 1854 Berkeley described a small fungus which accompanied spotting on ripe Apples; but it never seems to have been demonstrated that it was the cause of the spotting, and as nothing has transpired since which leads to the conclusion that it is really a fruit disease we can dismiss it with a brief notice.

The appearance caused is that of black patches of an irregular form on the surface of ripe Apples. Over these patches are scattered the minute points, which indicate the receptacles of the fungus. The sporules are long and slender (30 μ long) with six minute nuclei. Pears as well as Apples are said to have suffered from the same infliction.

Sacc. Syll. iii. 3028; *Cooke Hdbk.* No. 1307; *Berk. Ann. N. H.* No. 745, t. xv. f. 6; *Thüm. Pom.* p. 122.

Apple Scab.

Fusicladium dendriticum (Wallr.), Pl. X. fig. 3.

This disease appears under different forms, but in all cases it seems to be caused by the same fungus. On the leaves it comes in small olive spots, which are somewhat rounded and gradually enlarge, and become velvety and irregular; frequently two or three spots will run together and form a large irregular blotch. The mould also appears on the petioles and the young twigs. The threads of which the mould is composed have a radiating habit, from which its specific name is derived. On the fruit its appearance is similar, but as the spots increase in size the cuticle cracks and forms a light-coloured ring about their margin. The greatest vigour is towards the edge of the spots, where the fruit seems stimulated to the production of a kind of corky layer in its efforts to throw off the disease and the formation of scab. Generally the result is to produce on the fruit crackings with a thickened scabby edge.

The mycelium is rather superficial, and produces short erect brown threads at the apex of which the spores, or conidia, are produced. These bodies are somewhat oval, attenuated towards each end, so as to be thickest in the middle, or they are of an elongated Pear shape, and coloured brown, like the threads, but varying much in form and size. Although usually consisting of only a single cell, the conidia are sometimes divided by a septum towards one end into two unequal cells (30 × 7–9 μ).

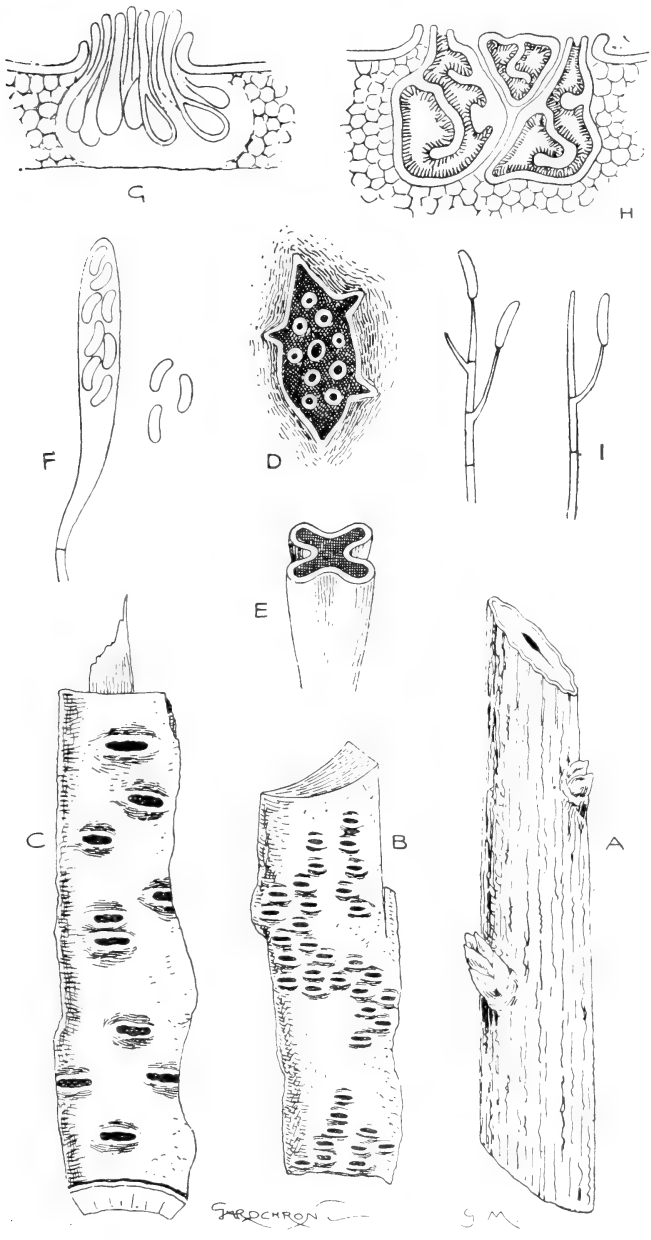


FIG. 3.—EUTYPELLA PRUNASTRI, CAUSING A DISEASE OF NURSERY STOCK.

A. A young Peach branch becoming shrivelled, indicating that the stock is dying. (Natural size.) B. The conidial stage of fruit bursting through the bark. (Natural size.) C. The second or ascigerous condition of fruit, showing at the surface through transverse cracks in the bark. (Natural size.) D. Surface of view of the second form of fruit, surrounded by the ruptured bark. (× 40.) E. Cruciate mouth of a perithecium. (× 400.) F. Ascus and spores. (× 400.) G. Section through ascigerous form of fruit. (× 80.) H. Section through conidial form of fruit. (× 50.) I. Conidia. (× 1,000.)

The conidia germinate rapidly in water or moist air, and scab spots on the fruit may be found covered with vast numbers of germinating spores. The germ tubes are rather thick and coloured, with frequent divisions, or septa; sometimes the germ tubes will produce secondary spores at their tips, which in turn germinate like the original spore. The conidia will germinate in pure water (50° Fahr.) within eight hours. It is believed that the mycelium is perennial, living in the fallen leaves and twigs, and especially in the fruit, during the winter.

It has been observed in America that the individual cells or joints of the mould, under favourable conditions, will push out germ tubes and develop new individuals of the species. "This method may be roughly compared to reproduction by root cuttings in higher plants."

In early spring spray thoroughly with sulphate of iron. As soon as the fruit is set apply Bordeaux mixture or a modified preparation of eau céleste.

In storing fruit especial care should be taken to separate all Apples which show any signs of "scab" from those which are sound and healthy, and store in a dry place.

This pest is recognised in France, Belgium, Germany, Austria, Italy, North America, and Australia.

Gard. Chron. Nov. 28, 1885, figs. 155, 156; *Mass. Pl. Dis.* 302. fig. 80; *Sacc. Syll.* iv. 1642; *Sacc. Fun. Ital.* t. 782; *Cooke Hdbk.* No. 1747; *U.S.A. Dep. Agri.* 1887, p. 341, with figs.; *Thüm. Pom.* p. 15; *Grevillea*, xx. p. 27; *Tubeuf, Dis.* 219, fig.

Apple rot, after scab, causes serious trouble in the United States. It is attributed to the common mould, *Cephalothecium roseum*, which has always been regarded as a saprophyte in Britain.

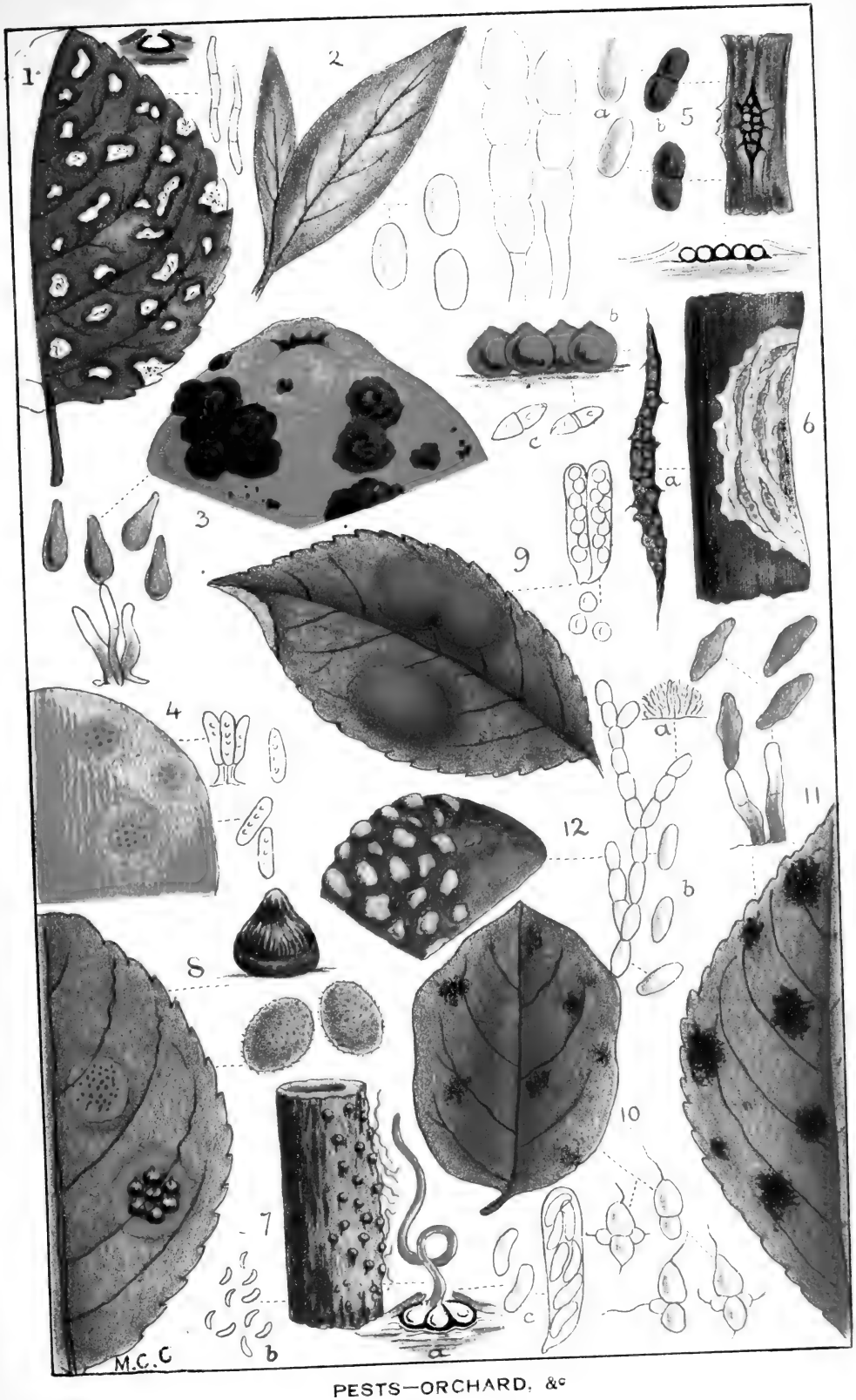
Bitter Rot of Apple.

Glœosporium fructigenum (Berk.), Pl. X. fig. 4.

Under the above name a disease is known in the United States which is attributed to this fungus as a cause. In this country it is rather doubtful whether the fungus is the cause of disease, since it has been affirmed that in most observed cases the fruits have been decayed before the fungus made its appearance. Still it must be conceded that nearly all the species of the genus to which it belongs are active parasites.

The pustules are circularly arranged in a cluster of a dirty rose colour, at length splitting the cuticle at the apex to discharge the contents. The conidia are cylindrical, sometimes curved, rounded at the ends and colourless (20–30 × 5–6 μ), produced at the tips of nearly equally long hyaline threads.

Notwithstanding that the fruit exhibits decay with us before the fungus is detected it may prove to be true that such decay has been caused by the *Glœosporium*. In America it is said that 'the affected Apple at first shows one or more black, or usually brownish, spots on any part of the surface; as these gradually enlarge their shape becomes more or less circular, and their borders somewhat sharply defined, sometimes the spots coalesce, or run together, and in this manner the entire Apple



PESTS—ORCHARD, &c

is soon affected. Towards the centre of the diseased spot there is usually a very dark, frequently almost black, discoloration. The darker portions are studded with minute black points, which are slighly raised above the surrounding tissue, imparting to their surfaces a somewhat roughened appearance ; occasionally these points are arranged in circles or grouped in little clusters."

It is affirmed that the spores when sown in water germinate within ten hours by sending out one or more thickish germ tubes. In about twenty hours they will produce at their extremity globose bodies (8 μ diam.), more or less dark-coloured, which are of the nature of secondary spores. These secondary spores germinate in like manner, and produce, in a third series, the same kind of bodies as the original primary conidia. So that by an alternation of generations the old type is reverted to.

In addition to the above it has been announced that thick-walled cavities have been found at the base of the conidia-pustules, which contain minute colourless bodies resembling spermatia ; what may be their purpose or destiny is still an open question. No wonder, then, that the Apple growers of the United States have been cautioned that they " have a dangerous foe to contend with," and they are on the alert.

The fungus is known in Britain, Italy, and the United States.

The remedies suggested are spraying with a solution of one half an ounce of sulphate of potassium to one gallon of water. Application at intervals of ten days. In some cases the disease was arrested after the first application. Another fungicide applied with success is the ammoniacal carbonate of copper solution.

Grapes are also liable to the same disease.

Sacc. Syll. iii. 3751 ; *Mass. Pl. Dis.* 281, fig. 75 ; *Gard. Chron.* 1856, p. 245 ; *U.S.A. Dep. Agri.* 1890, pl. iii. ; *Cooke Hdbk.* No. 1411 ; *Thüm. Pom.* 59 ; *Tubeuf, Dis.* 482.

Apple Speck.

Spilocæa pomi (Fr.).

An enumeration of the fungi which attack Apples and Pears would not be complete without reference to two or three obscure species which are reported to have occurred on the fruits. The little black specks upon ripe Apples which resemble fly-spots have not afforded any evidence of fructification. Known under the above name, they are probably only incipient conditions of " Apple scab."

The *Sphæria malorum* of Berkeley, found upon decaying Apples lying on the ground, would be outside the bounds of our inquiry, since it is clearly a saprophyte, and possibly only *Diplodia malorum.*

In 1878 Baron von Thümen published a work entitled "Fungi Pomicoli," in which he enumerated thirty-one fungi as growing on Apple and twenty-three on Pear trees, or their fruit. It is consoling to find that the majority of these are in no respect parasitic, and many of them common to all kinds of vegetable matter. Hence it is no guide to orchard pests.

Fr. Syst. Myc. iii. 504 ; *Thüm. Pom.* p. 9.

Apple-twig Tumour.

Botryodiplodia pyrenophora (Sacc.), Pl. X. fig. 5.

Little swellings are sometimes to be seen on Apple twigs in which the bark cracks in an irregular manner and exhibits beneath a cluster of black perithecia, about the size of pins' heads, closely packed together, and seated upon a kind of cushion formed from the mycelium.

These perithecia when mature contain a mass of rather large elliptical sporules, at first one-celled and colourless, but afterwards divided across the centre into two cells, and then of a deep brown colour. Possibly this is only a condition of a more highly organised fungus in which the spores are contained in asci.

Fig. 4.—Sphæropsis malorum.

It seems rather doubtful whether the "chancre" attributed to *Sphæropsis malorum* (*Bull. de la Soc. Myc. de France*, 1903, p. 134) may not be a condition, or stage, in the development of this same disease. (Fig. 4.)

At present this is a rare disease, and must be hunted after to be discovered; but it is quite possible for it to become a pest if it establishes itself in an orchard. Hitherto we have no record of its having become troublesome, and consequently no experiments have been made for its eradication.

We should certainly recommend its destruction wherever found, since it is quite capable of extending itself both by its mycelium and sporules.

Sacc. Syll. iii. 2121; *Cooke Hdbk.* No. 1254.

There is a small twig pustule, caused by *Phoma mali*, which is not so clustered or conspicuous on the twigs of Apple and Pear trees. The

sporules (8 μ long) are expelled when mature, and in some places it is looked upon with suspicion.

Apple-tree Canker.

Nectria ditissima (Tul.), Pl. X. fig. 6.

Ten or twelve years since R. Goethe propounded the opinion that canker on Apple trees was produced by the growth of the above-named fungus, which is of the *Sphæria* kind, a little resembling those clusters of red *Nectria* which are so common on Currant twigs, but smaller. Goethe claims to have demonstrated his position by cultivating the parasite both from conidia and ascospores. The same fungus he contends produces canker on various kinds of Pear trees, and the sporidia of the *Nectria* from the Apple were found to produce canker on the Beech and Sycamore, and again from these trees on the Apple.

According to Hartig the fungus enters through wounds caused by hail or the puncture of an insect. The best remedy, according to these authorities, is to cut out the diseased tissues and anoint carefully with coal tar.

The fungus consists of a number of little red dots, scarcely so large as a pin's head, growing in clusters in cracks of the bark. These minute dots are spherical and smooth, seated on a white mycelium, and when mature enclosing a kind of pulpy nucleus, like a tiny drop of gelatin, and which consists of a great number of long cylindrical tubes, or asci, each enclosing a row of eight elliptical sporidia, which are divided by a transverse septum into two cells. When ripe they are capable of germination from each cell (14×5–$6\,\mu$).

Occurs in France and Germany.

Gard. Chron. March 8 and April 19, 1884, p. 313; 1891, p. 300, figs. 66, 67; *Sacc. Syll.* ii. 4671; *Mass. Pl. Dis.* 127, fig. 24; *Grevillea*, ix. p. 116; *Tubeuf, Dis.* p. 187, figs.

Apple-bark Valsa.

Valsa ambiens (Fr.), Pl. X. fig. 7.

It is only during the past year or two that we have become satisfied that this usually saprophytic fungus has seriously affected living Apple trees—at least during its early or conidial condition.

The bark of living branches and trunks was observed to be roughened with little elevations from the apex of which proceeded what appeared to be a long twisted yellow filament, not thicker than a horse-hair, entangled together into a mass of golden threads. When moistened these threads dissolved into myriads of minute curved conidia (5 μ long) which had oozed out from minute punctures of the bark, and proved to be those of a fungus called *Cytospora carphosperma*, common on many orchard trees, but heretofore considered saprophytic.

The mature condition is to be found in spring on branches that have lain on the ground through the winter, and consists of clusters of receptacles, flask-shaped, with long converging necks, containing sporidia

which are cylindrical, curved, and rounded at the ends (16–18 × 3–4 μ), and of these eight are produced together in a membranous sac or ascus. This mature condition is only arrived at after hibernation, and consequently upon dead branches, but the early stage is clearly parasitic and may become troublesome. The mature stage is called *Valsa ambiens*.

Certainly whenever seen oozing out of living trees the parts should be well rinsed with Bordeaux mixture, so as to destroy all the germinating power of the conidia.

Sacc. Syll. i. 512; *Cooke Hdbk.* No. 2475; *Curr. Linn. Trans.* xxii. t. 48, f. 138.

Pear-leaf Cluster-cups.

Ræstelia cancellata (Reb.), Pl. X. fig. 8.

There is hardly any parasite which appears to be such a puzzle to gardeners as the *Ræstelia* or "cluster-cups" of the Pear leaves. They

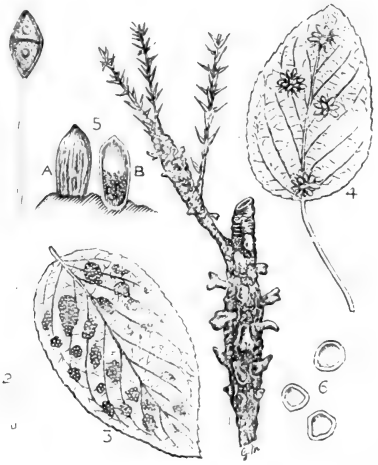


Fig. 5.—Pear-leaf Cluster-cup.

A fungus growing on two different kinds of plant at different periods of its life-cycle.

1. The spring stage of the fungus on a living Juniper branch, reduced in size. 2. Spore of same, × 300. 3, 4. "Cluster-cup," or summer form of fungus fruit on living Pear leaves, reduced in size. 5. Two cluster-cups, one cut open, slightly ×. 6. Spores of cluster-cup condition. × 300.

have also been a puzzle to others who are not gardeners, as evidenced by the literature of the past quarter of a century. We can permit the discussion to rest and state a few conclusions.

The parasite thickens the Pear leaves at the infected spots by the internal growth of the mycelium upon this, and externally are produced a small cluster of flask-shaped pale brown bodies called *peridia*, and these are soon split lengthwise nearly to the base into thread-like filaments which are for a long time united together at the apex. The contents of these flask-shaped bodies are the æcidiospores, which are nearly globose

and warted on the surface (25–40 × 18–25 μ). These spores are produced in chains, readily separating from each other.

Spots are also to be seen on the opposite side of the leaf to that which bears the *Rœstelia* and corresponding to it. These are conspicuous by their orange colour, which becomes reddish, sprinkled with blackish dots, which indicate cells containing very minute bodies called *spermatia*, which are expelled when mature.

It is recorded in Hooker's "British Flora" that when young Pear trees are planted near old trees suffering from the *Rœstelia* the young trees have been observed to become much injured by the fungus. Mr. Knight sowed Pear seeds in soil infested with *Rœstelia*, and the very youngest of the seedlings showed the disease.

According to theory it is contended that this kind of cluster cups must also have a condition analogous to the *Uredo* and *Puccinia* forms. As this is not known to take place upon the Pear tree itself, it is inferred that it must take place upon some other plant. The plant selected as fulfilling the condition is the Savin, and it is contended that the cluster cups of the Pear tree produces those gelatinous exudations on the stems of the Savin which are known under the name of *Gymnosporangium*.

Œrsted originated this suggestion in 1865, when he intimated that he had learned that gardeners were of opinion that the Pear fungus was never seen except after the appearance of the fungus on Savin. Hence he set to work to prove by cultures that the Pear fungus would produce the Savin fungus by inoculation, and *vice versa*. (Fig. 5.)

Incidentally Stevenson records that the Savin fungus is found in Scotland, but that the other condition, the Pear-leaf fungus, is not a Scottish plant.

The advice given to gardeners by the theorists is to destroy all Savin bushes, root and branch, if they would save their Pear trees. Berkeley, however, wrote:—"If picking the leaves off carefully and burning them will not do, we may feel secure that an onslaught against the poor Savin bushes will not avail us."

Known in France, Germany, Switzerland, Austria, and North America.

Sacc. Syll. vii. 2608; *Cooke M. F.* 193, t. 2, f. 2021; *Plowr. Br. Ured.* p. 230; *Mass. Pl. Dis.* 257; *Thüm. Pom.* 73; *Cooke Hdbk.* No. 1597; *Gard. Chron.* 1862, p. 689; *Tubeuf, Dis.* 399, fig.

Pear-leaf Blister.

Exoascus bullatus (Tul.), Pl. X. fig. 9.

The blister of Pear leaves is a disease which has long been known in this country, distorting the foliage in a similar manner to the "curl" on Peach leaves.

The under surface of the leaves is occupied by the external manifestations of the fungus, but the mycelium penetrates the leaf. The glaucous appearance of the hollows of the blisters consists of tufts of small cylindrical cells, or asci, each containing eight small ovate uncoloured sporidia (5 μ diam.). When these sporidia are mature the asci are ruptured at the apex, and they escape.

When first discovered this fungus was called *Oidium bullatum*, until the presence of asci was determined.

"In many cases these blisters formed two parallel lines on either side of the midrib, but sometimes they were irregularly scattered over the leaf. In some cases the blistered part had become black, and in others the portion of the leaf which had protruded had fallen out, so as to leave a regularly defined aperture. The cavities were found to be lined with a thin white stratum, consisting of myriads of confluent white specks of a waxy rather than a powdery appearance."

It is incumbent upon the cultivator to pick off all the blistered leaves and burn them, so as to keep a check on reproduction. Spraying young trees with Bordeaux mixture at intervals of a fortnight may be preventive.

Journ. R.H.S. ix. p. 48; *Sacc. Syll.* viii. 3343; *Mass. Pl. Dis.* 90, fig. 13; *Cooke Hdbk.* No. 2232, fig. 342.

Pear-leaf Blight.

Entomosporium maculatum (Lev.), Pl. X. fig. 10.

This disease is very destructive in the nurseries of the United States, although its presence in this country is rather doubtful.

Small red spots on the leaves first appear: these increase in size and become brown, or it may extend over the leaf, which then shrivels and falls to the ground.

The conidia, or sporules, have a very peculiar form, consisting of two nearly equal uncoloured cells attached end to end, and two smaller cells on opposite sides at the point of attachment, so as to present an unequal cross-shaped body. These conidia are produced superficially, in considerable numbers upon the leaves, extending also to the fruit ($18–20 \times 12\ \mu$).

It also attacks the leaves of the Quince. Pear fruits when attacked are liable to crack; hence a common name for the disease is "cracker."

Spraying with Bordeaux mixture holds the disease in check, using a very dilute solution. Dead leaves should be collected and burnt.

Sacc. Syll. iii. 3504; *Mass. Pl. Dis.* 276, fig. 73; *Galloway, Rep. Agri. U.S.A.* 1889, p. 357, pls. viii. ix.; *Tubeuf, Dis.* 480.

Pear-leaf spots, as distinct from those on Apple, are also recorded as *Phyllosticta pirina* and *Phyllosticta piricola* in Southern Europe, *Ascochyta piricola* in Italy, and *Septoria nigerrima* in Germany.

Pear Scab.

Fusicladium pirinum (Lib.), Pl. X. fig. 11.

Between the Pear scab and the Apple scab there seems to be very little difference except in name. The conidia are the same in size, and the little difference in form can scarce be material.

The external manifestations, both on the leaves and the fruit, are very similar: in the former case both form irregular velvety olive patches, which are apt to have a dendritic appearance on Apple leaves.

The threads are short and rather robust, and the conidia are typically rather fusiform, being attenuated towards each end ($28–30 \times 7–9$ μ), and we have never met them with a transverse division, whereas those of the Pear scab are usually of a club shape, and often divided into one large cell and one small one.

Known in Germany, Austria, Italy, Portugal, and France.

For remedies see also Apple Scab.

Sacc. Syll. iv. 1643 ; *Mass. Pl. Dis.* 304, fig. 81.

A mould with fusiform conidia, not unlike *Fusarium*, is recorded as affecting ripening Pears in France. It has been named *Discocolla pirina*.

American Pear Blight.

Micrococcus amylovorus (Burr.), Pl. X. fig. 25.

Pear blight, or fire blight, is known only in North America, and was first observed in 1780, but no description of it until 1817. "It frequently destroys trees in the fullest apparent vigour and health in a few hours, turning the leaves suddenly brown, as if they had passed through a hot flame, and causing a morbid matter to exude from the pores of the bark of a black ferruginous appearance." The results of epidemics have been most disastrous, especially the memorable year of 1844.

Various conjectures have been made as to its cause, the last of which, the bacterial, advocated by Professor Burrell, was supported by a long series of experiments by inoculating healthy branches with the juices of diseased ones and producing the disease, since which time the experiments have been confirmed.

The organism named *Micrococcus amylovorus* consists of single cells, of oval or roundish shape ($1–1\frac{1}{4} \times \frac{1}{2}–\frac{3}{4}$ μ) and quite colourless. For the most part they remain single, but may often be found in pairs, rarely a series of four or more, but never extending to chains.

Sacc Syll. viii. 3887; *Amer. Nat.* xvii. 1883, p. 319; *Arthur, History and Biology of Pear Blight*, 1886, plate; *Grove, Syn. Bact.* p. 10.

Medlar Cluster-cups.

Æcidium mespili (DC.).

This species of cluster-cups appears now to be recognised as distinct and alone, without *Uredo* or *Puccinia* to keep it company. It is only reported to occur on the leaves of *Mespilus* and *Cotoneaster*.

Rounded or irregular spots are formed upon the leaves, which are yellowish or reddish on the upper side, with a yellow border, thickened in the centre. The cups are cylindrical, splitting at the edge into narrow teeth or threads. Æcidiospores angular (19–24 μ diam.), very minutely warted and brown.

There is a suspicion of this species having been found in Britain, but it evidently has never given any trouble as a pest. It occurs also in France and in Germany.

Sacc. Syll. vii. 2773; *Plowr. Br. Ured.* p. 232; *Mass. Pl. Dis.* 258.

An anthracnose attacks the leaves of the Quince (*Glœosporium Cydoniæ*) in Southern Europe, as well as two or three kinds of leaf-spot, and *Oidium Cydoniæ* in Italy.

Medlar White Mould.

Oidium mespilinum (Thüm.).

This white mould occurs on the living leaves of *Mespilus* in Austria, forming broad white thin patches on the upper surface, which consists at first entirely of an epiphytal web of mycelium. From this shortly arise the fertile branches, which are at first simple and club-shaped. Afterwards two or three elliptical cells or conidia are cut off from the upper portion of the branches, and form the short chain of spores ($10 \times 6\ \mu$) which ultimately acquire a pale grey colour.

It is clear that this is an epiphyte of the same character as the various species of *Oidium* which precede such mildews as that which attacks the Hop, Rose, Gooseberry, Maple, Garden Pea, and many other plants.

In the case of any trouble the application of dry powdered sulphur is the safest remedy.

Sacc. Syll. iv. 208; *Grevillea*, xvi. 58.

Another white mould (*Ovularia necans*) has damaged Quince and Medlar trees in Italy and France. Two kinds of leaf-spots are known on Medlar leaves, but neither is recorded as British. *Phyllosticta mespili* and *Septoria mespili* are both of them European.

Plum Powdery Mildew.

Uncinula prunastri (DC.), Pl. XI. fig. 17.

This mildew resembles externally the previous species so much that it is scarcely possible to detect the difference by the naked eye. However, it is more commonly found on the wild Sloe than on the cultivated Plum.

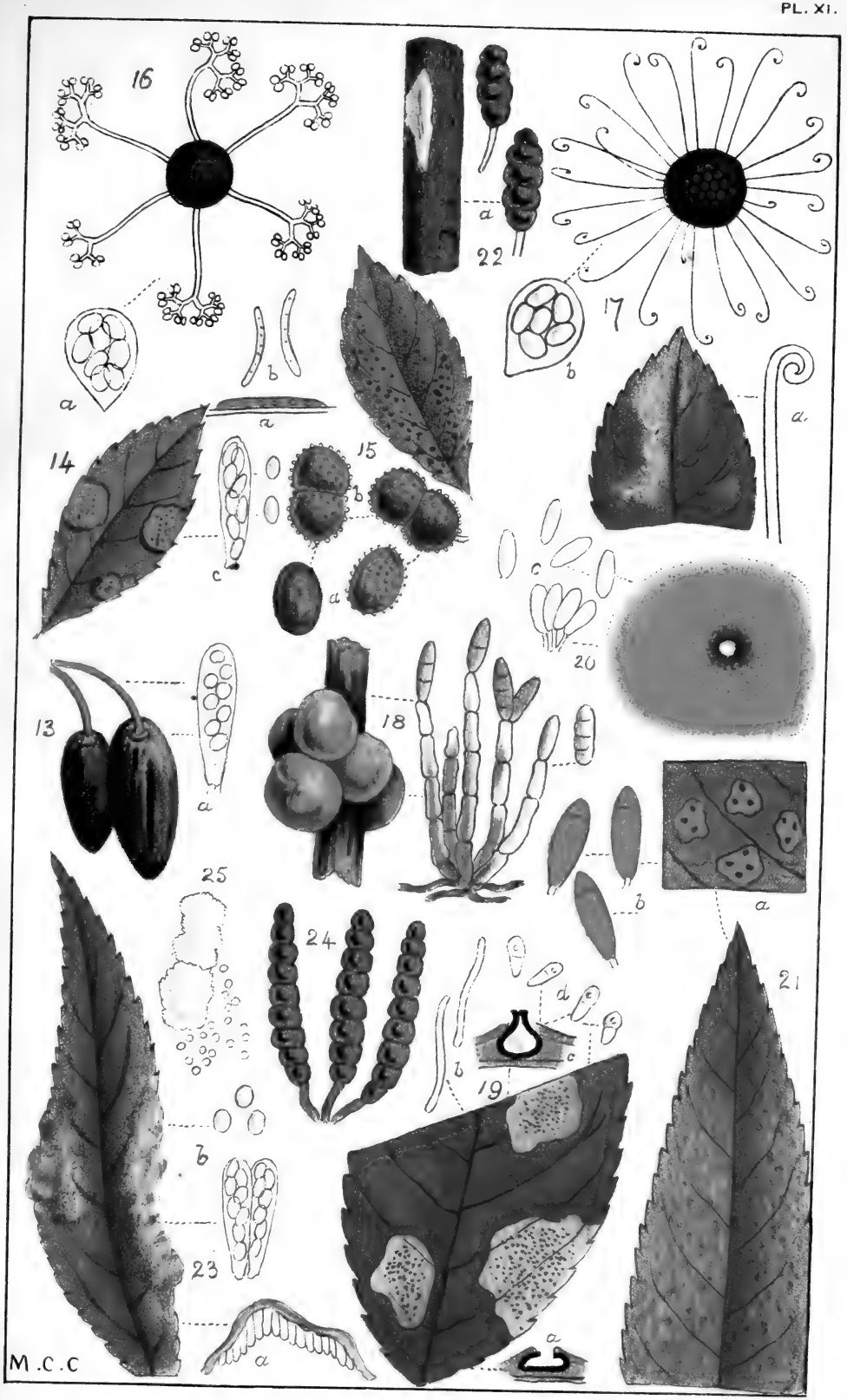
The mycelium is thin, and spreading over the surface of the leaves, giving them a frosty appearance, but never very dense. The conidia, in the early stage, are of the *Oidium* form, and are produced in short chains.

The receptacles are globose and minute, scattered over the mycelium, and scarcely visible to the naked eye. The appendages which surround the base of the receptacles are very numerous and peculiar in their character, inasmuch as they are unbranched and curved at their tips in a hook-like manner, and are about twice as long as the diameter of the receptacle. Each receptacle contains from twelve to sixteen transparent pear-shaped sacs, or asci, each of which contains six sporidia.

This species is found also in France, Belgium, Germany, and Italy.

As an epiphyte, should this species threaten to give trouble, it should be met with the sulphur treatment.

Sacc. Syll. i. 23; *Cooke M. F.* 239.



PESTS—ORCHARD, &c.

Plum Gummosis.

Cladosporium epiphyllum (Link.), Pl. XI. fig. 18.

Gumming, as exhibited in *Prunus japonica*, was made the subject of investigation by Massee in 1899, and the features were so apparently identical with those which takes place ordinarily in Plum and Cherry trees as to indicate the possibility of the cause being the same.

Stout branches were mostly attacked, and the disease was indicated by tear-like drops of almost colourless gum oozing from the branches. The drops increase in size so as to form irregular masses as large as a Walnut. Soft in damp weather, but in dry shrinking and horny, they gradually change in colour from grey to black as they increase in size; but this is external, as the colour diminishes towards the centre.

A black mould (*Cladosporium epiphyllum*) was traced as the cause of this disease, as a wound parasite, entering through small wounds in the bark, or where buds have been broken off. An olive patch of the mould first appears at the wounded point, and after the conidia are dispersed the drop of gum appears, and into this gum the threads of the mould extend. The threads are at first colourless and slender, but as the masses increase the tips of the threads nearest the circumference become olive, and broken up into chains of cells, many of which produce small sclerotia or compact masses of cells with thick dark brown walls. If the mass remains damp at this stage myriads of very minute conidia are produced by the large brown cells. If the conditions remain unchanged the conidia increase rapidly by gemmation. When the mass is dissolved away to the ground the conidia continue to reproduce themselves by gemmation.

Kew Bulletin, 1899, p. 1, pl.; *Mass. Pl. Dis.* 306; *Sacc. Syll.* iv. 1718.

Plum-tree Rust.

Puccinia pruni (Pers.), Pl. XI. fig. 15.

Nearly all kinds of Plum trees are subject to the ravages of the Plum-tree rust, but those attacks are not in all cases equally virulent. One tree may be seen in an orchard with hardly a leaf untouched, whilst another tree at twenty yards' distance will scarcely reveal a pustule.

The under side of the leaves are generally closely sprinkled with the pustules, which split irregularly and discharge the spores, light brown or rusty brown for the uredospores, dark brown for the teleutospores, in both cases powdery, and soon sprinkled over the leaf.

The uredospores are egg-shaped or Pear-shaped, and the whole surface minutely spiny (20–35 × 12–16 μ). These are the ordinary uredospores, or, as we might call them, the true uredospores. In order to meet a difficulty certain authors have recently professed that two kinds of uredospores are known, the second and last invented kind being elongated and of a *Uromyces* type, so much so that it has acquired the name of *Uromyces amygdali*. Whether this is also a *Uredo* form of *Puccinia pruni* does not interest us much, as we intend, in this place, to treat them as distinct diseases.

The teleutospores are divided in the centre into two cells, each of

which is nearly globose, except at their junction, where they are flattened, the lower cell being a little the smaller. The cell coat is chestnut brown and thickly covered with rather rigid obtuse spines (30–45 × 17–25 μ). At first the short uncoloured pedicels are distinct, but these finally disappear.

Known in Europe, North America, India, Cape Colony, Australia, and Tasmania.

McAlpine Fung. Dis. 23 ; *Journ. R.H.S.* xxvi. (1902), p. 963 ; *Sacc. Syll.* vii. ; *Plowr. Br. Ured.* 193 ; *Mass. Pl. Dis.* 251, fig. 64 ; *Cooke Hdbk.* No. 1511 ; *Cooke M.F.* 211 ; *Tubeuf, Dis.* 355.

Plum Pockets.

Exoascus pruni (Fckl.), Pl. XI. fig. 13.

Berkeley recognised this disease in 1876. The pockets, or "bladder Plums," appear soon after the fall of the flowers, attaining full size about the end of June, and then soon falling from the tree. They are at first nearly globose, soon becoming elongated, and often somewhat curved, from one to two inches in length, and a half to one inch in diameter. They much resemble the proper fruit when young, except in being yellowish or reddish in colour. With age the colour changes to grey, and the surface looks mealy or frosted, and wrinkled. Ultimately they turn nearly black, and in two or three days fall to the ground. The walls of the bladders are thick, permeated by mycelium, which also enters the hollow centre, and there is no stone. The fruits are evidently taken possession of by the fungus at an early stage, seed production arrested, and hollow bladders produced, which have some resemblance only to fruit.

The mycelium is of the usual kind, and may be found in the smaller branches in early spring before the diseased fruit appears. The fungus itself consists of small cylinders, or asci, standing side by side, closely packed, each cylinder containing eight small globose sporidia, which are ultimately ejected at the ruptured apex (4 μ diam.).

The sporidia germinate readily in water by the formation of a bud, which assumes the form of the parent spore. The secondary spore produces a bud like the first, and so on, through several generations.

It is recommended to remove the "pockets" as soon as they are formed. In the United States it is the practice to cut back the branches so as to destroy all parts likely to contain mycelium.

Sacc. Syll. viii. 3342; *Mass. Pl. Dis.* 85, fig. 12 ; *Ward, Dis. Pl.* p. 107 ; *Thüm. Pom.* p. 88 ; *Tubeuf, Dis.* p. 155, fig.

Plum-leaf Blotch.

Polystigma rubra (Pers.), Pl. XI. fig. 14.

These blotches are very rare upon the leaves of the cultivated Plum, but are common enough on those of the Sloe.

The blotches are orbicular or angular, of a brick-red colour, with a decisive and definite outline, thicker than the leaf, with a waxy appearance, and when mature dotted over the surface with darker minute

dots, or points, which indicate the buried receptacles which enclose the fruit.

There are two stages to this fungus: the early one in the spring (*Polystigmina*) contains only stylospores or conidia, borne upon slender threads (30 μ long).

The autumnal fruit (*Polystigma*) is not matured until after a period of rest, such as is obtained by the fallen leaves upon the moist ground. Then the fruit consists of sporidia ($10 \times 6\,\mu$) which are ovate, enclosed in asci, and ultimately escape when mature to reproduce the species.

Known also in France, Belgium, Sweden, Germany, Switzerland, Italy, and N. America.

Sacc. Syll. ii. 4587; *Mass. Pl. Dis.* p. 135, fig. 25; *Cooke Hdbk.* No. 2410, fig. 383; *Grev. Sc. Cry. Fl.* t. 120; *Tubeuf, Dis.* p. 189, fig.

Plum-tree Mildew.

Podosphæra tridactyla (Wall.), Pl. XI. fig. 16.

The earliest appearance of this disease on Plum and Cherry trees is a whitish mealy, or mouldy, appearance on the living leaves, which thickens until the surface appears as if dusted with flour or powdered chalk; ultimately little orange, and then black, dots show themselves scattered over the mealy substratum.

In its first stage the pest consists solely of the branched and interwoven mycelium of delicate threads, which produce short erect club-shaped branches, soon divided into joints, which fall away from the apex, when mature, as oval conidia of the *Oidium* type.

Afterwards, when the black dots appear, it has passed into the *Erysiphe* condition, the dots representing the globose receptacles enclosing the fruit. These conceptacles are attached by delicate threads to the mycelium, and above these, in a circle around the receptacle, are ranged a circle of radiating arms or appendages, usually six or seven, standing out from the sphere. These are tawny below and colourless above, divided in a forked manner three or four times at the apex. Each receptacle contains a Pear-shaped hyaline sac, or ascus, which holds the eight ovate sporidia. The variety which occurs upon Cherry leaves differs chiefly in having from eighteen to twenty appendages around the receptacle.

This is an epiphyte, and hence, like many of its kindred, may be amenable to the sulphur treatment.

Common through the whole of Europe and North America.

Sacc. Syll. i. p. 3; *Cooke Hdbk.* No. 1916, fig. 315; *Cooke M. F.* p. 239.

Cherry Brown Rot.

Monilia fructigena (Pers.), Pl. X. fig. 12.

This is the same disease which has been referred to in connection with the Apple, and also as the Apricot brown rot. However it rarely attacks Cherries in this country, although prevalent in the United States.

For fuller details see "Apricot Brown Rot."

Cherry-leaf Spot.

Coryneum Beijerinckii (Oud.), Pl. XI. fig. 22.

The attacks of this fungus have been recognised in at least two different ways—in one as a leaf parasite and in the other as the main cause of gummosis. Under the former aspect it has been found on Cherry, Peach, Apricot, Almond, and Plum. In the spring the young leaves are found to exhibit red or rosy spots on the under surface as well as on the young shoots. Later on the tissue in such places turns brown and dies, when the fungus appears in minute black dots which are grouped on the dead spots, and in these the conidia are produced.

The dots, or pustules, are at first developed beneath the cuticle, forming compact discs, which are at length erumpent. The conidia are seated upon a kind of cushion or stroma, crowded together, and are oblong, pale olive, with three septa ($28-32\times11-13$ μ) on hyaline pedicels.

Later in the season a second form of fruit appears, and ultimately it is believed that another form appears, which has been called *Ascospora Beijerinckii*, wherein the spores are enclosed in asci.

This disease has been recognised in the Netherlands as well as in Britain.

No remedies have yet been pronounced successful, but probably spraying at the earliest period when there is any indication of the presence of the disease may be effectual.

Sacc. Syll. iii. 4058; *Mass. Pl. Dis.* 294.

Gummosis.

Gummosis is not by any means a new or uncommon disease, which has been attributed to various causes and latterly to the presence of a fungus under the name of *Coryneum Beijerinckii*. Whatever may be the cause the remedy has not yet been found.

It is contended on behalf of those who advocate the *Coryneum* theory that the disease may be communicated by inoculation; but the presence of mycelium or even more advanced fungoid growth in the morbid spots is extremely probable, apart from any active participation in the disease. Unfortunately the disease is common enough, but the presumed fungus is so rare that only one or two persons have professed to have seen it in this country. It must be remembered also that the species of *Coryneum* otherwise known are saprophytes, and the presumption is strong against the assumed cause of gummosis.

Massee contends that the cause of gummosis in *Prunus japonica* may be traced to the action of *Cladosporium epiphyllum*.

It is recommended that diseased branches should be removed or collar pruning resorted to. The soil around the trees may be treated with quicklime on the surface to destroy conidia in the soil.

Gard. Chron. Mar. 29, 1884; 1891, fig. 68; *Kew Bulletin*, 1899, p. 1, plate; *Mass. Pl. Dis.* 306, fig. 82; *McAlpine Fung. Dis.* p. 67.

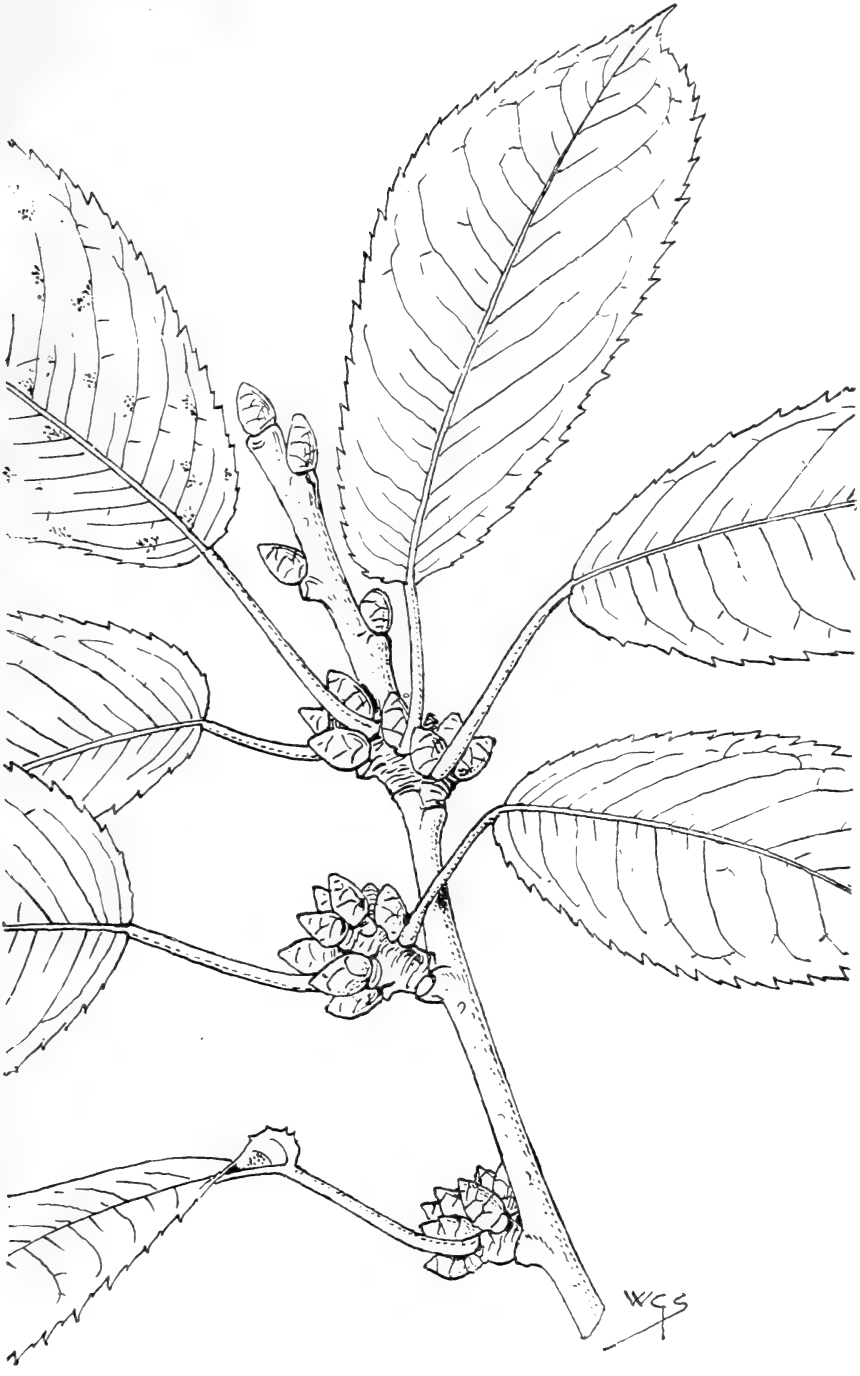


FIG. 6.—TWIG OF CHERRY INFESTED WITH GNOMONIA ERYTHROSTOMA.

Witches' Broom of Cherry.

Exoascus cerasi (Fckl.).

Those peculiar malformations, which are known under the name of witches' brooms, are not uncommon on various trees, and amongst them the Cherry. Under these attacks the disease shows itself in the production of dense tufts of branches, growing apparently from a central point, and forming a bunch like a besom, which is very common on the Birch.

This malformation is caused by the presence of a fungus similar to that which causes the leaf curl of the Peach, and which appears as a hoary bloom on the branches. The vesicles, or asci, which contain the sporidia are slender and club-shaped (30–50 × 7–10 μ), enclosing the nearly globose sporidia (6–9 × 5–7 μ). These asci are supported at the base upon a distinct stem-cell (10–16 × 5–8 or 3–5 μ), which is divided off from the ascus by a transverse septum.

Known also in Germany, where it was first recognised and described.

The only known remedy is to cut out the tufts and burn them.

Sacc. Syll. x. 4734 ; *Tubeuf, Dis.* p. 163, figs. ; *Mass. Pl. Dis.* 89, 358.

Cherry-leaf Scorch.

Gnomonia erythrostoma (Awd.), Pl. XI. fig. 19.

This disease sometimes makes it appearance in Cherry orchards in great numbers and proves destructive to the crop.

The leaves are attacked and soon present a scorched appearance, withering, but hanging on the tree through the winter. Long slender colourless curved conidia are produced, and in this condition it is known as *Septoria pallens*.

During the winter another and final stage is attained by the fungus produced on the dead hanging leaves (*Gnomonia erythrostoma*). In this condition the receptacles are immersed in the substance of the leaf, with a short beak, or ostiolum, which pierces the surface. Within the receptacle cylindrical cells, or asci, are produced, each of which contains eight elliptical sporidia, which are colourless and divided by a central septum into two cells (18 × 5 6 μ), each cell enclosing two guttules, and terminated by a curved hair-like appendage, which soon falls away. (Fig. 6.)

Known in Germany, Switzerland, and Italy.

All the dead hanging leaves should be collected and burnt. Frank says that in one district in Prussia this method was carried out for two seasons, after which the Cherry crop, which had been ruined, was restored.

Sacc. Syll. iii. 2637, i. 2214 ; *Mass. Pl. Dis.* p. iii. fig. 19 ; *Journ. R.H.S.* xxv. 1901, p. 313, fig. 162, xxvii. p. 1140 ; *Tubeuf, Dis.* 222.

Shot-hole Fungus.

Several species of leaf-spot have been recorded in Australia, and elsewhere, attacking leaves of Plum and Cherry, forming round spots, the dead tissue of which soon falls out and leaves a round hole in the leaf.

American shot-hole fungus (*Septoria cerasina*) occurs on Plum and Cherry leaves, and has strongly curved conidia (50–75 μ long).

Another shot-hole fungus (*Cylindrosporium padi*) having curved filiform conidia (48–62 × 2 μ) occurs also in the United States.

An Australian shot-hole fungus (*Phyllosticta prunicola*) affects the leaves of Apple, Plum, and Cherry in similar manner in Italy, and extends to Australia (5 × 3 μ).

The genuine Australian shot hole (*Phyllosticta circumscissa*), as it claims to be, attacks Cherry and Peach leaves (8 × 2 μ).

Besides which a white mould (*Ovularia circumscissa*) is credited with forming similar shot holes in Cherry leaves in Russia (15–18 × 6–7 μ).

And a black mould performs the same office (*Cercospora circumscissa*) upon Plum leaves in the south of Europe, in the United States, and in Australia (50 × 3½–4 μ, 3–4 septate).

Still another shot-hole fungus, and one of the most common in Australia, is a black mould (*Clasterosporium carpophilum*) on Peach, Almond, Cherry, and Apricot (54 × 14 μ, 4–5 septate). This is known also in Italy, Switzerland, Austria, and Portugal.

Strange that none of these should yet have paid a visit to Britain.

McAlpine Fung. Dis. p. 33.

American Black Knot.

Plowrightia morbosa (Sacc.).

Although this is an American disease, unknown in Europe, it is the worst enemy of the Plum and Cherry in the United States. It forms black rough excrescences on the branches, often several inches in length. At first the branch swells, which is followed by a longitudinal cracking and gaping of the bark. Then the surface is covered with a dark olive velvety coating of mould, which produce the conidia.

Later on in the season the olive mould disappears, and a thick outgrowth of fungus mycelium succeeds, which produces a stroma, or bed for the ensuing fungus. During the winter, cavities are formed in this stroma, and these contain cylindrical sacs, or asci, closely packed together, each enclosing eight sporidia, which are oblong, unequally two-celled (16–20 × 8–10 μ).

As it is confined to the United States we must leave with the sufferers to adopt the best means at their disposal to exterminate the pest.

Farlow, Bull. Buss. Inst. 1876, p. 440, plates; *Sacc. Syll.* ii. 5295; *Mass. Pl. Dis.* p. 137, fig. 26.

Peach Rot, or Anthracnose.

Glœosporium lœticolor (Berk.), Pl. XI. fig. 20.

This disease attacks the mature fruits and produces depressed spots which are whitish in the centre with a blackened margin. The pustules are circularly arranged towards the centre, and are rosy, seated beneath the cuticle. The conidia, which are produced in the pustules, are oblong,

with the contents retracted at each end, oozing out when mature in pale rosy tendrils (16–17 μ long).

The same disease is credited with attacking Figs when approaching maturity, although some writers have suggested that the species which attacks Figs is the same as that which attacks Apples and Grapes (*Glœosporium fructigenum*). The difference between them is mainly in the size of the conidia, whilst the precautions and remedies remain the same.

All the species of "Anthracnose," as they are termed in America, are dreadfully injurious, and are recognised as the most persistent of pests.

Sacc. Syll. iii. 3753; *Gard. Chron.* 1859, p. 604, and December 6, 1890; *Cooke Hdbk.* No. 1410; *Thüm. Pom.* p. 57.

Peach Rust.

Uromyces amygdali (Pass.), Pl. XI. fig. 21.

We confess to being incorrigibly heretic on many points in connection with the rust fungi, and this one in particular.

When the rust on the Peach leaves was first submitted to us we declined to regard it as any form of *Puccinia pruni*, and accepted the name given by Passerini of *Uromyces amygdali*. We are concerned with the rust of Peach leaves and not now with the usual form on the leaves of Plum, and it is our pleasure to treat them as distinct diseases.

The underside of Peach leaves is liable to be affected with a rust the pustules of which are small and numerous. The cuticle is soon split, and the spores scattered as a fine rust-coloured dust. The form of these spores is quite unusual for those of a uredo, but approaching the type which is common in the teleutospores of *Uromyces*. They are considerably elongated, swollen in the middle, and almost bluntly lance-shaped, quite smooth externally, with the coat of the spore considerably thickened at the apex, and continued at the base into a rather short thick pedicel (35–40 × 12 μ). In fact, except to a uredomaniac, more like the teleutospores of *Uromyces* than the uredospores of *Puccinia*.

Latterly the specialists of a special kind have been driven to the alternative of suggesting that there must be two kinds of uredospores associated with *Puccinia pruni*, and that this is "the other one."

This rust is more common in the United States than it is with us, but it is found also in Southern Europe and in Australia.

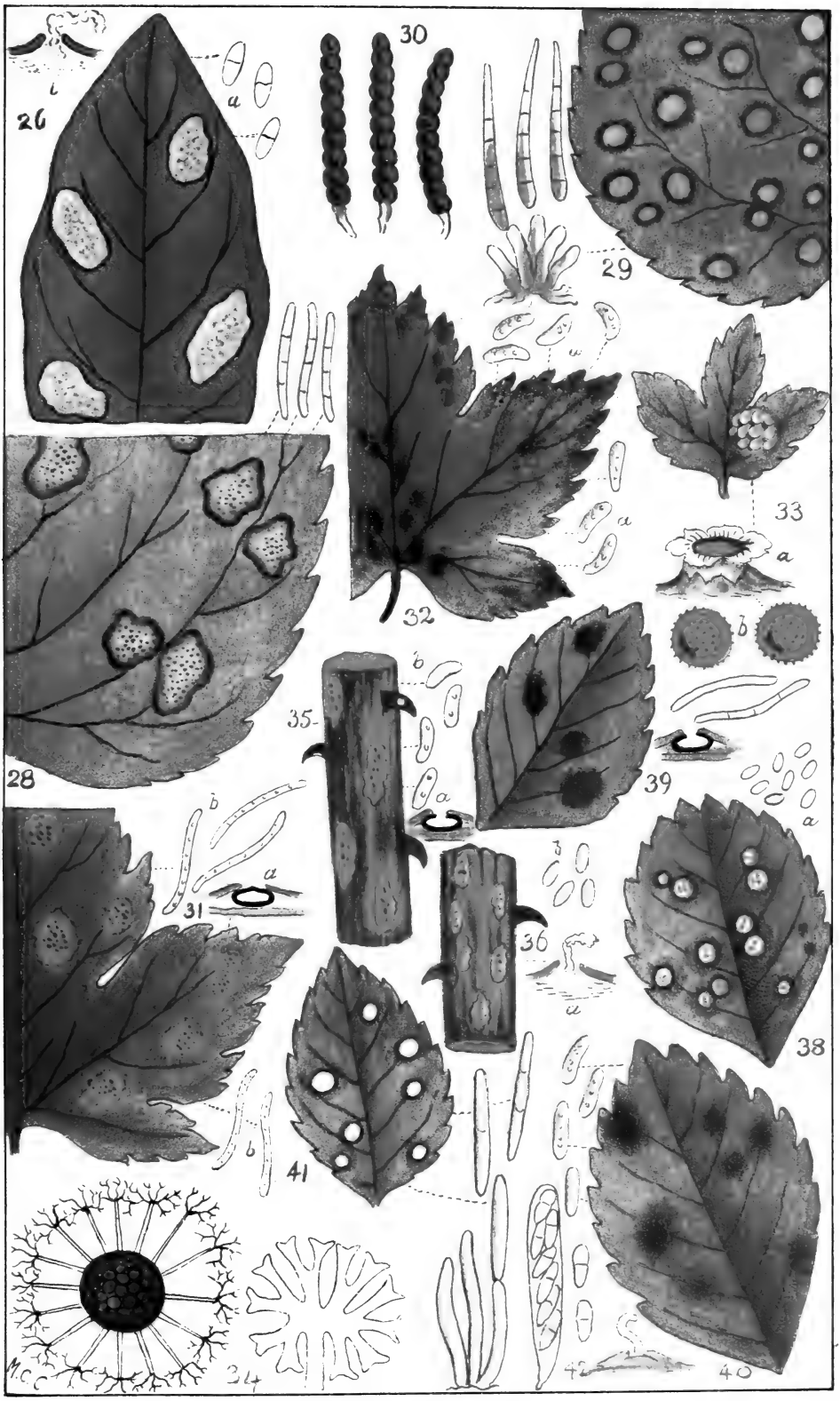
Cooke in Rav. Fungi Exsicc.; Cooke Hdbk. Austr. Fungi, No. 1734.

Peach-leaf Blister.

Exoascus deformans (Berk.), Pl. XI. fig. 23.

Peach-leaf blister is such a common affection that a description is scarcely necessary. Sometimes aphides or other small creatures may produce somewhat similar appearances, but the real Peach blister is an established fact.

The leaves are puffed up, blistered, and contorted in a variety of ways,



PESTS—ORCHARD, &c.

and this disfigurement will proceed until it spreads gradually over the entire tree unless it is checked at once.

The under surface of the leaves, in the hollows of the blisters, assumes a hoary or frosted appearance, and when examined under the microscope is found to consist of a number of cylindrical cells formed of a transparent membrane closely packed together side by side, each cell or ascus containing the elliptical sporidia (7×5 μ) in the same manner as in the Pear blister and in the Plum pockets.

This disease is sometimes called the "curl," from the curling and distortion of the leaves.

Diseased or fallen leaves should be burned. Branches bearing diseased leaves should be pruned back beyond the point of infection. The disease is rampant if the leaves receive a sudden check from fall of temperature. Activity of the disease has been checked by a sudden increase of temperature.

Known in France, Germany, Belgium, Sweden, Austria, Italy, North America, South Africa, Algeria, Australia, China, and Japan.

Gard. Chron. July 9, 1887; *Mass. Pl. Dis.* 82, fig. 11; *Cooke Hdbk.* No. 2233; *Berk. Outl.* p. 376, t. i. f. 9, a. 6; *Sacc. Syll.* viii. 3341; *McAlpine Fung. Dis.* p. 13.

Peach Freckle.

Cladosporium carpophilum (Thüm.).

This disease is known in the United States as "scab" or "black spot," and was first observed in Austria in 1877, but has not been recognised anywhere else in Europe, although known in the United States and Canada and New South Wales, and is said to spread rapidly when once introduced.

The fungus is a kind of black mould which attacks ripe Peaches, forming minute round spots or freckles, which are greenish, then brownish or olive. Finally the spots run together and form a brown crust, causing the fruit to crack, shrivel, and decay. It has also been observed on the foliage. The spots are orbicular, and the threads short and slightly branched or simple, with pale ovate conidia, which are rarely septate (20×5 μ).

So nearly allied to the "Apple scab" that similar treatment is recommended.

Sacc. Syll. iv. No. 1675; *Mass. Pl. Dis.* 310; *McAlpine Fung. Dis.* 49, pl. vii.

Peach-spot Mould.

Helminthosporium rhabdiferum (Berk.), Pl. XI. fig. 24.

This disease first attacked the Barrington Peach in 1864, but has never spread much since that time or proved of any great importance.

Shallow pits, about half an inch in diameter, appear on the surface of the fruit the centre of which is occupied by a dark mould bearing a profusion of spores, so as to blacken the fingers when touched. The mycelium penetrates deeply into the fruit, which if not gathered in good

time becomes useless. The mycelium consists of more or less waved articulated threads which give off here and there stouter erect threads, with shorter joints, branched slightly above and producing at the tip of each joint a large spore. The spores, or conidia, are at first oblong and pale, showing one or two transverse septa. These rapidly acquire a dark tint, elongate, become more or less linear, and consist of from seven to eleven swollen divisions, of which the terminal one is mostly apiculate. Each division contains a few minute oil granules (50–80 μ long). After the spores have fallen they frequently split in the centre and give out a globular body, which is in all probability reproductive.

We strongly suspect that this fungus is not a true parasite, but made its appearance subsequently, and was not the cause of disease.

Gard. Chron. 1864, p. 938, fig.; *Cooke Hdbk.* No. 1726.

The "frosty mildew" caused by *Cercosporella persicæ* has been known in America since 1890 on Peach leaves.

Peach Yellows.

This is one of the most mysterious of plant diseases, and although it has been known to occur in the United States for at least a century it has not found its way into Europe. In recent years "thousands of young and thrifty trees have been destroyed by it, and Peach growing has been abandoned in several parts of the country where formerly there were large and profitable orchards." The earliest symptom is the premature ripening of the fruit; then diseased dwarfed growths appear on the trunks and limbs. The limbs attacked are badly diseased the second year, the entire growth being stunted and of a sickly green tinged with yellow. After this they may languish for a few years, and then die gradually from the extremities downwards. All efforts to discover fungoid mycelium has failed, and it is only recently that the disease has been attributed to microbes. In 1889 Professor Burrill intimated that he had found "in the tissues of the root and of the old and young stems of diseased trees an organism classed with the bacteria which is not known to occur elsewhere. This organism has been frequently obtained by method of cultures under circumstances which preclude the possibility of its coming from anything except the inner cells of the tree. He had it growing in artificial media, and it exhibited all the peculiarities of a pathogenic rather than a saprophytic microbe. He found it in every set of specimens which he examined, known to be affected by the disease, and has thoroughly tried in the same manner to find it in healthy stock and failed."

Silver Leaf.

Stereum purpureum (Fries).

This disease has been known as affecting fruit trees in this country for fully a quarter of a century, and has puzzled mycologists and pathologists to account for the cause. Recently Professor Percival has conducted some experiments which he considers will demonstrate that the disease

is caused by a wound parasite, which in its fully developed form is a hymenomycetal fungus called *Stereum purpureum*.

At the same time it has been affirmed on good authority that several Horse Chestnut trees in Greenwich Park have been killed by attacks of this same fungus, which has, at any rate, been developed freely on the dead bark.

Attacks Plum, Peach, and Apricot trees.

We must still regard ourselves as sceptical as to whether the *Stereum* is the cause of "silver leaf."

Sacc. Syll. Hym. ii. 7284; *Cooke Hdbk.* No. 910; *Journ. Linn. Soc., Bot.* xxxv. p. 390, pl. x. 1902; *Journ. R.H.S.* xxvii. (1902), p. 712.

Apricot Brown Rot.

Monilia fructigena (Pers.), Pl. X. fig. 12.

This disease attacks indiscriminately a number of pulpy fruits, the Apple and Pear in this country, and the Cherry and Apricot in the United States. In 1864, which was a very dry season, the Apricots in many gardens were attacked. Fruits were in some cases spotted whilst quite green, in other cases the attack did not seem to take place till they were nearly ripe. The intermediate or half-ripe condition was apparently that in which the attack was most prevalent. The first indication was a little discoloured brownish spot, very slightly sprinkled with whitish minute tufts of threads, on some of which a solitary spore might be found. The subjacent tissue at this stage is traversed by multitudes of thick, succulent, branched threads. The progress of the disease is rapid, the brown spot increases in size, the centre is occupied by a dense mass of mould consisting of closely set roundish tufts the threads of which bear necklaces of spores, the central ones lemon-shaped, and as the disease spreads the little tufts often assume a concentric disposition. At length the whole fruit gives way, and either drops off or remains attached to the tree, withered and wrinkled, like a large mouldy Plum (conidia 25 × 10–12 μ). (Fig. 7.)

The methods hitherto recommended for this disease are to remove and destroy all diseased fruit and to spray the trees, so as to prevent the germination of all the spores which may be adhering to the bark. Dissolve four pounds of sulphate of iron in five or six gallons of water.

Gard. Chron. Aug. 27, 1864; *Mass. Pl. Dis.* 300, fig. 79; *Sacc. Syll.* iv. No. 157; *Cooke Hdbk.* No. 1812; *Tubeuf, Dis.* 497; *Journ. R.H.S.* 1902, xxvi. p. 738, fig. 311; *McAlpine Fung. Dis.* p. 53, pl. viii. fig. 2.

Walnut Anthracnose.

Marsonia Juglandis (Lib.), Pl. XII. fig. 26.

This parasite on Walnut leaves has long been known in this country, and certainly sometimes appears to take possession of nearly every leaf of a full-sized tree.

The spots appear on the under surface of the leaves, and are large, often irregular in form, being limited by the veins of the leaves, generally

of a greyish colour, at length causing the leaves to fall. The pustules are seated on the spots, and are flattened and of a brown colour, at length expelling the mature conidia through a pore or fissure. The conidia are

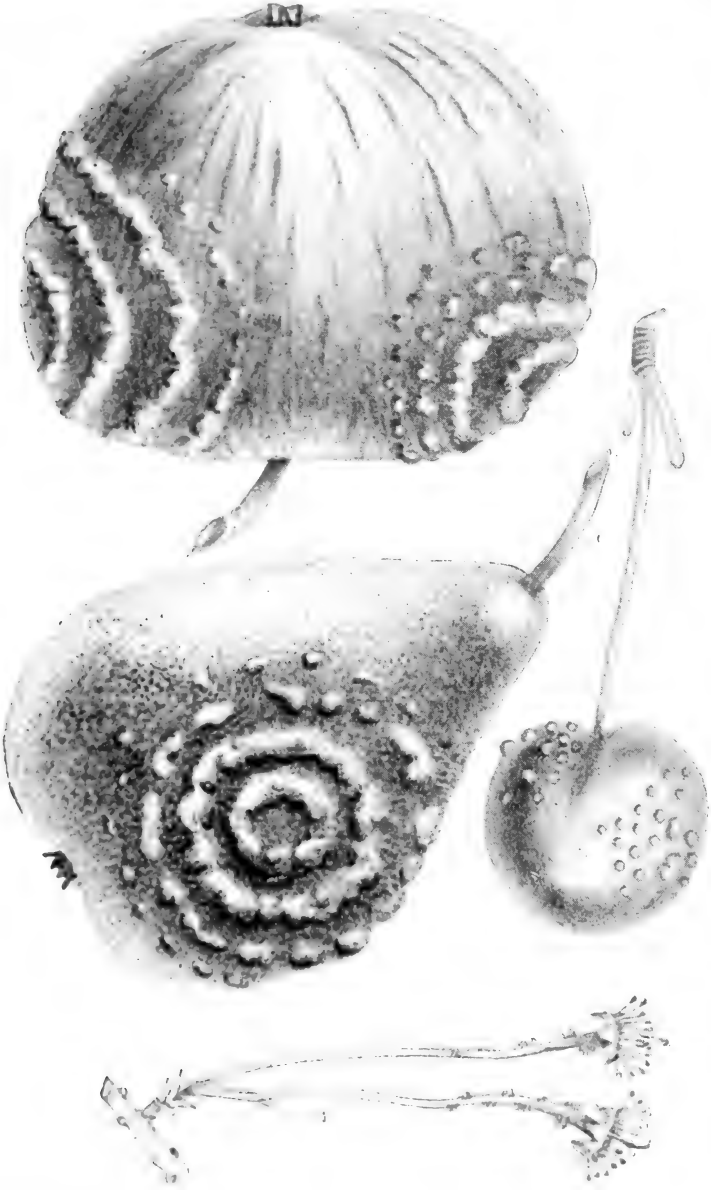


Fig. 7. - Brown Rot of Fruit (*Monilia fructigena*).

somewhat spindle-shaped, a little beaked at the apex, and divided by a septum across the centre into two cells (20–25 × 5 μ).

It has been recorded in France, Germany, Portugal, and Italy.

Sacc. Syll. iii. 4028; *Cooke Hdbk.* No. 1233.

Fig Anthracnose.

Glœosporium fructigenum (Berk.), Pl. X. fig. 4.

In the year 1864 certain Fig orchards in Sussex were attacked by a disease, so that the whole crop became more or less affected, and the fruits dropped off before they were ripe. On this occasion the fungus appeared as a circular patch of little pustules, which were destitute of any common receptacle, but constituted little cavities which contained a mass of minute hyaline elliptical sporules, or conidia, enclosing a small nucleus at each extremity. When matured the walls of the cell contracted, and the sporules were forced out from an opening at the apex in the form of little tendrils.

We have referred to this same disease previously as attacking Apples, and must revert to it for any additional information.

Gard. Chron. 1856, p. 245, Aug. 27, 1864; *Mass. Pl. Dis.* p. 281; *Cooke Hdbk.* No. 1411.

Fig-tree Canker.

Libertella ulcerata (Mass.).

This is a disease which has recently been recognised as causing cracking and canker in the bark of Fig trees and shelling off large patches as the disease progresses.

The fruit of the fungus is produced within minute cavities of the bark, and the very small conidia ooze out to the surface like fine hairs, which are composed of conidia stuck together by a tenacious gluten which becomes dissolved by moisture and liberates the exceedingly small conidia. These conidia obtain an entrance into the bark through wounds, and thus the disease is spread.

It is recommended that all wounded surfaces should be coated with tar at once. By no means should any knife be used in pruning or trimming which has been employed in cutting out diseased parts until it has been cleaned and disinfected, as a knife with adhering germs has been known to infect a healthy tree.

Gard. Mag. July 23, 1898, fig.; *Mass. Pl. Dis.* 292.

Fig Grey Mould.

Botrytis cinerea (Pers.).

Only recently we have been made acquainted with the serious injury inflicted on green Figs by the attacks of a grey mould, which it is difficult to distinguish specifically from *Botrytis cinerea*. The mould appears in grey velvety patches at the apex of the fruit, being preceded by a softening and rotting appearance of the tissues, which are soon reduced to a pulpy mass. No trace of sclerotia has yet been observed.

The sterile hyphæ are creeping, interwoven; the fertile are erect, gregarious in broad patches, of a greyish colour, either simple or sparingly branched, with several short simple or divided branchlets near the apex, septate, a little constricted at the septa, smoky-brown (about 12–14 μ

thick); conidia broadly elliptical or almost subglobose, nearly colourless (10–12 μ diam.), collected in somewhat globose heads.

It is hopeless to dream of saving the fruit when once attacked, but all diseased fruits should be burnt at once to prevent diffusion of the conidia. Spraying uninjured fruit may save them from attack.

Mass. Pl. Dis. 380; *Cooke Hdbk.* No. 1801.

Mulberry-leaf Spot.

Phleospora mori (Lev.), Pl. XII. fig. 38.

Mulberry leaves are sometimes marked by rather large irregular spots or bleached tissue circumscribed with a definite border line of brown. The spots themselves are pale, either dirty white or tinged with ochre. Scattered over the upper surface of the spots numerous black dots indicate the small globose receptacles sunk into the substance of the leaf.

Within these receptacles are produced the elongated cylindrical conidia, or sporules, which are curved, rather obtuse at the ends, and divided across by three septa, or occupied by four guttules, or nuclei, entirely colourless, and at first growing from short sporophores, or pedicels (40–50 × 4 μ).

First observed in this country at Clevedon, and since then has been found in several localities. At one time the theory was promulgated in France that this disease of the leaves was the cause of "muscardine," or silkworm disease, but for lack of evidence the theory soon gave way.

Trees when once attacked continue to suffer year after year with increasing energy. Cold weather appears to check it, but in warm seasons it extends rapidly.

The disease is known in France, Italy, Germany, Austria, and Russia.

Sacc. Syll. iii. 3136; *Grevillea*, vi. p. 72, xiv. 104; *Gard. Chron.* Nov. 1877.

Mulberry-leaf Blight.

Cercospora moricola (Cooke), Pl. XII. fig. 29.

Nearly at the same time that the Mulberry spot appeared in this country another disease was found affecting the leaves of the Mulberry tree both in this country and in the United States. It belongs to a genus of black moulds which are really very persistent in their attacks and very troublesome to the cultivator, but not likely to be of so much importance to us as to countries where the leaves are required in connection with the silkworm industry.

The spots occur on both surfaces, and are orbicular, of a reddish-brown colour. Upon these spots are produced tufts, or bundles, of short olive threads, which burst through the cuticle and produce at the apex of each thread a long narrow spore, or conidium, which is three or four septate, and narrowed towards one end (70 × 3 μ).

No experiments have been made to control this disease, as in its present development it cannot affect the production of fruit.

Sacc. Syll. iv. 2281; *Grevillea*, xii. p. 30.

Mulberry Black Mould.

Clasterosporium parasiticum (Cooke), Pl. XII. fig. 30.

When the Mulberry-leaf spot was first found in this country it was accompanied by another fungus of a very different character, which appeared to be parasitic upon the same spots. Nearly every spot had its centre blackened by some parasite, which it was ultimately found had no relation whatever to the original disease.

This fungus consisted of cylindrical spore masses with a short stem and almost always obtuse apex divided by numerous septa, and constricted at the joints so as to be torulose, or with a beaded appearance ; of a clear brown colour when mature, and not unlike a caterpillar in miniature.

We have inserted this visitant here, not because we retain any suspicion that it will prove to be a pest, but as a guide to its identification should it accompany the leaf-spot again, and in order to secure more definite assurance that it is only a saprophyte on the dead tissue of the spots.

Grevillea, vi. p. 74, with fig.

Hazel-leaf Mildew.

Phyllactinia suffulta (Sacc.).

Filberts being cultivated to a considerable extent as a table fruit, the shrub will fall more naturally into position here than in the shrubbery. The name by which the mildew was known for very many years was *Phyllactinia guttata*, but it has since suffered in the lust for change.

The under surface of the leaves is frequently covered with a delicate white mildew consisting of a creeping interwoven mycelium of thin threads with short erect branches bearing conidia. In the course of time the little dark globose receptacles make their appearance, scattered over the surface of the mildew. These little conceptacles are encircled by a ring of spine-like, pointed, divergent appendages with a swollen base, which stand around and guard the receptacles.

Each receptacle encloses from four to twenty hyaline pouches, or asci, which contain the sporidia, of which there are usually two, sometimes three or four in each ascus (40–50 × 22–25 μ).

This is one of the superficial fungi to which it is believed that the application of sulphur is beneficial, as in the case of the Hop mildew.

Sacc. Syll. i. No. 13 ; *Mass. Pl. Dis.* 98, 361, fig. 16 ; *Cooke M. F.* xi. figs. 219, 220 ; *Cooke Hdbk.* No. 1912 ; *Tubeuf, Dis.* 179, fig.

Hazel-leaf Spot.

Septoria avellanæ (B. & Br.).

This leaf-spot was recorded by Berkeley, but does not appear to be of very common occurrence. The receptacles are found on the under surface of the dry and bleached parts of the leaves, but the sporules are

rather anomalous in size and form for this kind of spot, since they are fusiform and curved (10 μ long).

The species has also been observed in Italy.

Grevillea, v. p. 56; *Sacc. Syll.* iii. 2717.

Hazel-leaf Blotch.

Gnomoniella Coryli (Batsch).

This fungus has long been known on Hazel leaves, and has had its name changed a great many times. It occurs on the living leaves in black shining raised patches on the under surface, resembling little drops of pitch. Each cluster is composed of several receptacles arranged in a circle and immersed in the black stroma, with long projecting necks, each neck surrounded by a white fringe-like collar.

Within the receptacles are a series of cylindrical tubes, or asci, which enclose the sporidia, eight of which are contained in each tube, and each one is colourless and oval, without any division (7 × 3 μ).

When these leaves fall to the ground the sporidia soon arrive at maturity, and are discharged to fulfil their duty in the perpetuation of the species.

There is an earlier and imperfect stage (*Leptothyrium Coryli*), in which the sporules are free in the receptacles (18 × 2 μ), but the precise nature of their relationship is not distinctly known.

Sacc. Syll. i. 1590; *Cooke Hdbk.* No. 2736; *Tubeuf, Dis.* 224.

The above is not common enough or harmful enough to cause the least anxiety.

Root Fungi.

It has been known for the past fifty years—and Berkeley was continually reverting to it, and asserting it, in the pages of the *Gardeners' Chronicle*—that the white fleecy mycelium often seen about the roots of orchard trees was injurious to them; that it originated from dead stumps and buried wood, and attacked the roots of living trees when it was no longer a saprophyte, but became a parasite and crept up between the cortex and the wood, and ultimately killed the tree. This is now more generally acknowledged to be true, whatever the ultimate development of the mycelium might be, possibly some Agaric, and that dead wood and dead roots left in the soil when young trees are planted will sooner or later prove the source of great injury and destruction. It has been left to more recent times to demonstrate that mycelium which originally, and in ordinary cases, was only a saprophyte could under favourable conditions become a dangerous parasite.

Under such circumstances it will be seen that trees should never be planted in soil which contains the remains of dead stumps or dead roots, and whenever growing trees are discovered with this mycelium at the roots they should be removed and the soil sterilised before it is planted again. Diseased roots, if not too far infected, should be cleaned and pruned before replanting, and well washed with some fungicide, when, in some cases, they may possibly recover; otherwise they should be burnt forthwith.

Orchard Agarics.

Armillaria mellea (Vahl).

This very common Agaric grows in large clusters at the base of stumps and old trees, and often in orchards where the mycelium extends to and becomes parasitic on growing trees, causing great mischief.

The fungus grows in dense clusters with a pale honey-coloured pileus or cap, two to three inches across and a paler stem four to six inches long, with a distinct collar or ring surrounding the stem above the middle and a profusion of white spores, which fall and settle on surrounding objects as a dense white powder. (Fig. 8.)

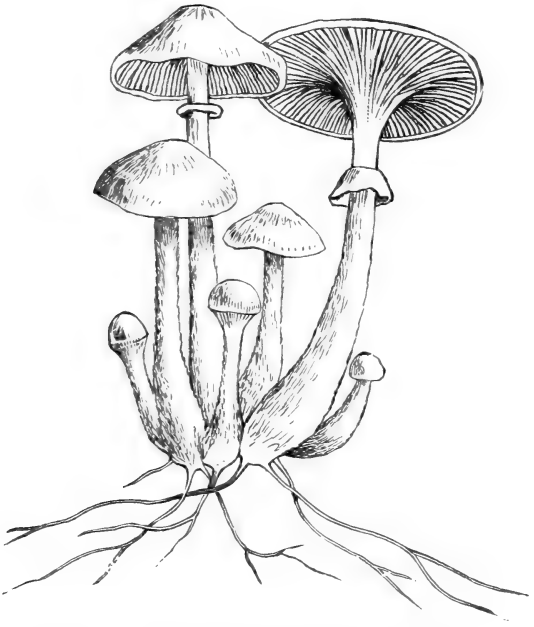


Fig. 8.—Tree-root Rot (*Armillaria mellea*).

The black strands of mycelium, thick as fine twine, and known as "rhizomorphs," are well known, and generally belong to this Agaric.

Sacc. Syll. vi. 289; *Mass. Pl. Dis.* p. 202, fig. 47; *Cooke Hdbk.* No. 36, fig. 36; *Cooke Illus.* pl. 32.

Pholiota squarrosa (Müll.).

Dense tufts of this Agaric may often be seen at the base of trunks in orchards, and is capable of doing great injury by the mycelium becoming parasitic. The Agaric is similar in size and form to the above *Armillaria*, but both cap and stem are yellowish brown, densely clad with projecting brown scales, and the spores, and consequently the gills, are brown. The smell is strong.

Sacc. Syll. vi. 3093; *Mass. Pl. Dis.* p. 208; *Cooke Hdbk.* No. 297; *Cooke Illus.* pl. 367; *Sow. Fung.* t. 284.

Tinder Polypore.

Fomes fomentarius (Fries).

It is strongly contended by some writers that the woody Polypores which are common mostly on forest trees will attack fruit trees as wound parasites, and compass their destruction. One species is found sometimes on fruit trees, which become as hard as a wooden log. In shape it somewhat resembles a horse's hoof, with a smooth upper surface of a dark brown colour attached firmly by the back, so as to project like a bracket. The under surface is almost flat, or a little concave, pale, and punctured with minute pin-holes or pores close together all over the surface. These pores contain the spores, which are snuff-coloured and

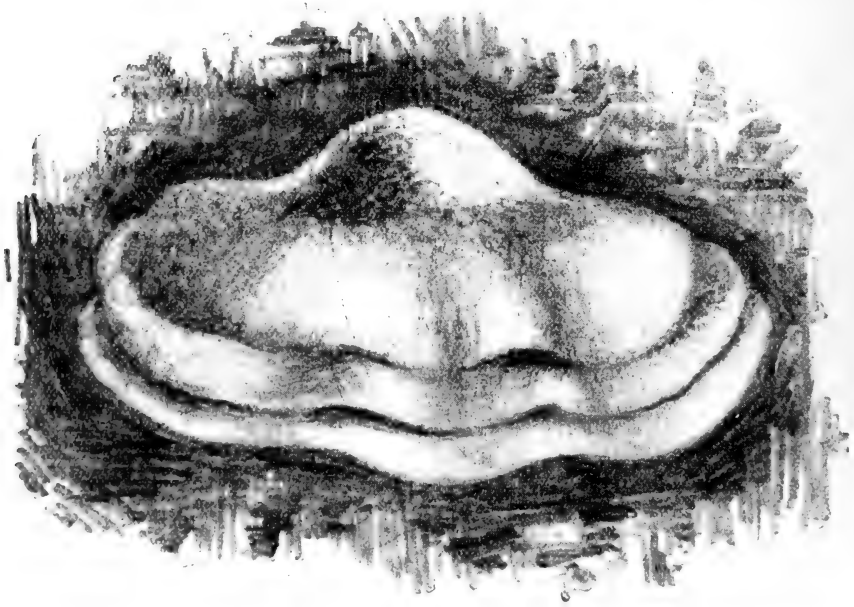


Fig. 9.—Fomes fomentarius.

profuse, so that they fall when mature on all surrounding objects like snuff. This is a wound parasite, the spores finding an entrance into its victim tree through a wound, and afterwards developing on the surface.

One of these wound parasites is *Fomes fomentarius*, which is common on Beech trunks and occasionally on fruit trees. All such fungi should be cut away and the wound dressed with gas tar. (Fig. 9.)

The woodcut is not by any means a good characteristic figure.

Sacc. Syll. Hym. ii. 5409; *Cooke Hdbk.* No. 776; *Journ. R.H.S.* xxvi. (1902), p. 734, fig. 308; *Mass. Pl. Dis.* 185, 392.

Currant-leaf Spot.

Septoria ribis (Desm.), Pl. XII. fig. 31.

This spot appears to be confined to the living leaves of the Black Currant, and is certainly common enough. The spots are small and

irregular, brown then purplish, sprinkled with the minute dots of the innate conceptacles which are covered by the cuticle, which are exceedingly small, with a minute pore at the apex, through which the mature spores are ejected in a roseate tendril. The spores, or conidia, are very long and thread-like, curved, containing a row of guttules (50 μ long).

In common with most kinds of leaf-spot, this affection is treated generally with great indifference, the general impression being that it only affects the leaf upon which it grows, and does not in any way influence the general health of the bushes.

Known in France, Germany, and the United States. In New Zealand it is known as the Gooseberry rust. "After the crop is off Bordeaux mixture may be used, and should be again applied, full strength, before the buds break, early in the following season as a preventive. All leaves to be raked up and burned."

Sacc. Syll. iii. 2649; *Cooke Hdbk.* No. 1338; *Grevillea*, xiv. 76; *Journ. R.H.S.* xxv. (1900), p. 143, fig.

Currant Bleached Spot.

Phyllosticta ribicola (Fr.).

The spots are sometimes found on the leaves of the Red Currant, and are rather large and bleached, with a number of minute black conceptacles scattered over the surface like pin-points.

The conidia are simple and small, oblong and colourless (15–17 μ long).

Sacc. Syll. iii. 82.

Gooseberry-leaf Spot.

Phyllosticta grossulariæ (Sacc.).

The spots on the leaves of the Gooseberry are similar to those on the leaves of the Currant, but smaller, and with a circumscribing brown line. They differ also in the smaller sporidia, which are not more than one third the length of the foregoing (5–6 × 3 μ).

This species is known in most parts of Europe and also in North America, but is treated as though it were regarded as practically harmless.

Sacc. Syll. iii. 83.

Another Gooseberry leaf-spot (*Ascochyta grossulariæ*) is known in Europe with apparently two-celled conidia.

Currant Anthracnose.

Glœosporium ribis (Lib.), Pl. XII. fig. 32.

Although this species of leaf-spot is tolerated without complaints, it is sufficiently common, but not so injurious as most species of Anthracnose. It generally affects the leaves of the Red or White Currant, on which it produces circular spots, sometimes confluent, and wholly brownish in colour. The pustules appear on the upper surface of the spots, concealed

beneath the cuticle, being somewhat flattened and of a darker reddish brown externally, but whitish within, and without any true conceptacle. The mass of spores is whitish, and is ejected when mature through a central opening in the cuticle. The conidia, or sporules, are oblong and curved (10×5 μ). In wet weather they may be seen oozing out in a tendril through the aperture in the cuticle.

It is bad policy to treat any of the species of Anthracnose with contempt, seeing that they may give trouble at any time should a favourable season occur; and it has proved to be very far from harmless in the United States, where the remedy recommended is spraying with one of the copper solutions.

Sacc. Syll. iii. 3694; *Mass. Pl. Dis.* 286; *Cooke Hdbk.* No. 1235.

Gloeosporium curvatum, known in Holland on Black Currant leaves, has larger conidia ($14–20 \times 5–7$ μ).

Gooseberry Cluster-cups.

Æcidium grossulariæ (Gmel.), Pl. XII. fig. 33.

These cluster-cups seem to be rather erratic in their appearance, as in some years they can scarcely be found at all. They occur principally on the living leaves or the green fruit.

The spots on the leaves are yellow on one side and reddish on the other, with a yellow border. The cups are clustered in the centre of the spots, and are rather long, with the usual white fringed margin. The æcidiospores are bright orange, produced in chains, but freely separating into somewhat globose spores, with a finely spinulose surface (10–20 μ diam.).

This is one of those fortunate species whose fate is not linked with any *Uredo* or *Puccinia*. Up to now no enthusiast has imagined for it a graminivorous bride, and for the present it has to run its course in single blessedness.

The species is known in France, Belgium, Germany, Lapland, Denmark, Switzerland, Asiatic Siberia, and North America.

Quite recently it has been decided by authority that the proper *Uredo* and *Puccinia* are to be found on the leaves of species of *Carex*.

Sacc. Syll. vii. 2787; *Cooke M. F.* 192; *Gard. Chron.* July 1881, figs. 15 19; *Mass. Pl. Dis.* 95; *Cooke Hdbk.* No. 1620; *Plow. Br. Ured.* 263.

Gooseberry Mildew.

Microsphæra grossulariæ (Lev.), Pl. XII. fig. 34.

A little of the Gooseberry mildew appears every year, but it does not always proceed beyond the mealy or conidial stage. The living leaves become whitened and chalky, as in the allied species, from the interwoven mycelium, which spreads over the surface of the leaves. Its occurrence has been most observed in very dry seasons and on both sides of the leaves. The first stage is an *Oidium*, with its chain of conidia.

The receptacles are always few and scattered, being small and globose as usual, and attached to the mycelium by a small bundle of fibres from the base. The circle of appendages which surround the conceptacle consists of from ten to fifteen colourless radiating slender arms, which are forked near the tips, each branch being again forked, and the extremities of all the branchlets split into two teeth, which are pointed, and not thickened as in some other species.

The contents of the mature conceptacles are from four to eight ovate sacs, or asci, each of which encloses four or five hyaline sporidia, so that each conceptacle may contain from sixteen to forty spores.

The mycelium of these mildews does not in the first instance establish itself within the substance of the leaves, and never enters to any appreciable extent. Hence it is an epiphyte, and has only to be destroyed to restore the vigour of the affected plants. It is in this class of diseases that the application of sulphur is likely to prove most beneficial.

Sacc. Syll. i. 40; *Cooke M. F.* 240; *Cooke Hdbk.* No. 1922; *Mass. Pl. Dis.* 95, fig. 15; *Journ. R.H.S.* xxv. (1900), p. 145.

American Gooseberry Mildew.

Sphærotheca mors-uvæ (Schw.).

This disease has been widely and well known in the United States for scores of years, but only recently has visited Ireland, which entitles it to notice here. As a proof of its virulence, one American writer states: "The mildew of the Gooseberry is the most serious obstacle to the successful culture of the foreign Gooseberry in the United States."

It first makes its appearance on the young half-grown leaves and the unfolding bud of the shoot. Then it has a cobwebby appearance, which soon becomes white and powdery. Soon after this patches may be found on the berries, usually on one side more than on the other. Later on the leaves, petioles, and young stems turn a rusty brown colour, and become thickly coated with the fungus. The berries at the same time are covered with brown patches of mycelium, which may be readily peeled off.

The conceptacles are developed upon the mycelium in this species, as well as on the Hop mildew, and the sporidia (15 μ long) are in like manner developed within the asci.

Experiments made have shown that as a fungicide in this instance potassium sulphide was far more effective than Bordeaux mixture, lysol, or formalin, using one ounce of potassium sulphide to two gallons of water. Repeat the application every ten days till the fruit is nearly mature.

Sacc. Syll. i. No. 12; *Grevillea*, iv. p. 158; *Journ. R.H.S.* xxv. (1890), p. 140, fig. 37; xxvii. (1902), p. 596, fig. 166; *Mass. Pl. Dis.* 97. 362.

Gooseberry Polypore.

Fomes ribis (Fries).

This hard woody *Polyporus* may often be found growing at the base of the stems of old Gooseberry and Currant bushes, and has now the credit of being a true parasite.

It consists of a hard woody pileus, almost hoof-shaped and often several together, one placed above the other, and from two to four inches across. The upper surface convex, yellowish brown, and when young minutely velvety, but becoming bald and smooth when old, with concentric zones. The under surface nearly plane, and pierced with innumerable minute pores of a brownish grey colour. When cut in section the fibrous flesh is of a rusty brown colour.

This fungus is perennial, and lasts from year to year, but is only found on quite old bushes, which may easily be replaced by more youthful successors.

Sacc. Syll. Hym. ii. No. 5427; *Mass. Pl. Dis.* 185; *Cooke Hdbk.* No. 780.

Raspberry Cane Spot.

Phyllosticta pallor (Berk.), Pl. XII. fig. 35.

This spot on the living Raspberry canes was first observed by Berkeley many years ago, and was called *Ascochyta pallor*, albeit the conidia were not two-celled.

Roundish or elliptical paler spots are formed on the canes, over which the dot-like receptacles are scattered immersed in the substance of the spot, which is pierced by the dot-like orifice. Around this opening the substance is a little raised and blackened, so as to form a kind of ring. The conidia are sausage-shaped, narrow and slightly curved, obtuse at the ends (14–18 × 4–5 μ).

Has been very little observed, although apparently a true parasite. Hence it is not likely to give trouble, or it would scarcely have rested so long.

Apparently only known in Britain and Holland.

Sacc. Syll. iii. 2206 and 4912; *Berk. Ann. N. H.* No. 193, fig.; *Cooke Hdbk.* No. 1356.

Raspberry cane blight, attributed to *Coniothyrium Fuckelii*, is more or less common in the Raspberry plantations of New York State, causing the plants to die about the time that the fruit is ripening. The fungus is known in Europe.

Raspberry Anthracnose.

Gloeosporium venetum (Speg.), Pl. XII. fig. 36.

We are not thoroughly convinced that this Anthracnose has occurred in Britain, although it is well known in Continental Europe, in the United States, and in Australia.

On the leaves it produces large marginal spots of a honey colour, margined by a distinct purplish line; towards the centre of the leaf the spots are smaller and rounded. On the petioles and young twigs the spots are more definitely elliptical and pallid, and on the young canes.

The pustules are without any true receptacle, sunk in the substance of the leaf or stem, and the conidia are produced within these cells,

elliptical and colourless (7–8 × 2–2½ μ), often with two small nuclei, and ejected when mature through a fissure in the cuticle as a gelatinous boss or tendril.

The conidia germinate readily and spread the disease. Young canes are not killed the first season, but succumb on the second, the fruit remaining small and shrivelled. Spraying with sulphate of iron solution and diluted Bordeaux mixture has been recommended. Nothing will save the canes when thoroughly attacked, and the only alternative is to burn and prevent the spread of disease.

Sacc. Syll. iii. 3962 ; *Mass. Pl. Dis.* 286 ; *Tubeuf, Dis.* 483.

Raspberry canes are reported in Australia as suffering from attack at the roots of the mycelium of the very common clustered Agaric (*Hypholoma fasciculare*), so plentiful about old stumps in this country.

Raspberry Brand.

Phragmidium rubi-idæi.

This very interesting brand, or rust, of the Raspberry, more often makes its appearance on the wild than upon the cultivated plants. In fact, it never has been an orchard pest, and yet it has been long enough known to have been called by at least thirteen names.

It is supposed to have a species of Cluster-cups, just to save the consciences of the uredinists, although nothing like a Cluster-cup. This is the old *Uredo gyrosa*, with the pustule forming a little kind of ring which is indented in the centre. Æcidiospores (?) globose, rough, yellow, (20–28 μ diam.).

The uredospores form little pustules, scattered, or sometimes gathered in circles, the spores being spherical or ovoid, rough, and orange yellow (16–22 μ diam.).

The teleutospores are the most imposing, being produced in tufts or clusters, the upper portion, or the proper teleutospore, being elongated, cylindrical, rounded at each end, or with a hyaline wart like apiculus at the apex, divided transversely into from six to ten cells (90–140 × 20–35 μ), externally warted, and of a dark-brown colour, with a long colourless stem (110–160 × 17–20 μ), a little thickened below, straight or curved, and a little flattened laterally.

Each cell is capable of separate germination, as if it were an individual spore.

Known in France, Belgium, Ardennes, Switzerland, Germany, Finland, Austria, Lapland, Italy, and North America.

Sacc. Syll. vii. 2626 ; *Mass. Pl. Dis.* 258 ; *Cooke M. F.* 201, f. 43 ; *Cooke Hdbk.* No. 1459 ; *Grevillea*, iii. t. 45, fig. 9 ; *Plowr. Br. Ured.* 226.

Little Strawberry Spot.

Phyllosticta fragaricola (Desm.), Pl. XII. fig. 38.

This is one of the ordinary forms of spot on Strawberry leaves in which the spots are small, rounded, and whitened in the centre, with a

blood-red margin. The conceptacles are few upon the spots, and dot-like. The conidia, or sporules, are oblong and minute ($5 \times 2\ \mu$).

It is noteworthy that in so many of the species of *Phyllosticta*, or spot with minute spores, we should have similar and corresponding spots of the *Septoria* type with long thread-like spores, that is to say, there may be on the same kind of leaves spots precisely similar, which in one case produce minute spores and in another long and thread-like spores, the difference being entirely that of the fructification. It has been suggested that the perithecia which at an early period produce minute sporules may at a later period produce thread-like sporules; but this is only conjecture without evidence. And yet future knowledge of the life history of these parasites may make it all plain.

Sacc. Syll. iii. 219; *Grevillea*, xiv. 73.

A leaf-spot precisely similar is known in Portugal and Italy (*Ascochyta fragariæ*) in which the sporules are elliptical ($12–15 \times 3–4\ \mu$) and two-celled. Has appeared also in the United States, and threatens mischief.

Strawberry-leaf Spot.

Septoria fragariæ (Desm.), Pl. XII. fig. 39.

This spot is familiar upon all Strawberry plants, but commonly in a sterile condition. It occurs upon the upper surface of Strawberry leaves as circular brown spots with a reddish brown margin. The conceptacles are very minute, sprinkled over the spots as little black dots with a rather broad pore at the apex through which the mature conidia are expelled in a whitish tendril. The conidia, or spores, are long and cylindrical or thread-like, with three transverse divisions and colourless (about 50 μ long).

It is unknown if any and what relations subsist between the several species of fungi which thrive with us upon Strawberry leaves. It has only been supposed that there is some connection, but it has not been demonstrated.

Sacc. Syll. iii. 2767.

Strawberry Anthracnose.

Gloeosporium fragariæ (Lib.), Pl. XII. fig. 40.

This disease is not at all uncommon on Strawberry leaves, but has never caused anxiety, since it was not credited with the power of inflicting serious injury. The spots are reddish on the upper surface, without any determinate outline. Upon these spots appear flattened blackish pustules, which nestle beneath the cuticle. The mass of conidia form a greyish nucleus within the cavity of the tissue. The conidia, or spores, are cylindrical, obtuse, and contain a row of four or five guttules ($26–42 \times 4\ \mu$). There is no genuine conceptacle, but the surrounding cells are discoloured, and when mature the conidia ooze out at the apex of the pustules in globules or tendrils during moist weather and are washed over the foliage.

All species of this genus are suspicious, and we doubt if this is really so innocent as has generally been supposed.

It is known in France, Belgium, Germany, and the United States.

Sacc. Syll. iii. 3690.

Strawberry Spot Mould.

Ramularia Tulasnei (Sacc.), Pl. XII. fig. 41.

This fungus spots the leaves in a very similar manner to the ordinary leaf-spot. They are rather small orbicular white spots with a broad definite dark-reddish margin, but without any dots. A white mould is seated upon the spots, which produces little bundles of colourless threads, and these develop at their tips cylindrical hyaline conidia which are straight, with one or two cross divisions (30–35 × 3–4 μ). What appears to be the same fungus was known here for some years under the name of *Cylindrosporium Grevilleanum*. The life history of this fungus has been investigated in North America, and hence we know more of it than of most leaf-spots, and that this fungus constitutes the conidia of another fungus, which appears later on and is known as *Sphærella fragariæ*. For our purpose we may treat them as two separate diseases, with different manifestations and different treatment.

The mould is known in Britain, France, Italy, Holland, and North America.

In this stage it is more likely to submit to treatment by fungicides than in the more mature or resting condition.

Sacc. Syll. iv. 988; *Sacc. F. Ital.* t. 1006; *Mass. Pl. Dis.* 107.

Ripening fruits are liable to attack from *Oidium Balsami*, already described (*ante*, vol. xxvii. p. 806).

Strawberry-leaf Blight.

Sphærella fragariæ (Sacc.), Pl. XII. fig. 42.

When a spot first appears on a young leaf it is brownish or reddish, then becomes circular with a dead white centre (3–6 mm.) and broad purple border. Subsequently conidia are produced as already described (*Ramularia Tulasnei*), which for some time are produced in succession from the same threads. If these conidia fall on a fresh leaf surface they germinate in a few hours. In the latter part of the season the mycelium becomes compacted into sclerotia, which are capable of germinating and producing a crop of conidia in the spring.

Perithecia are developed in late autumn, but are not matured until the spring, upon the white centre of old spots. Asci are produced within these perithecia, each containing eight oblong colourless two-celled sporidia (15 × 3–4 μ).

The fungus passes the winter under three forms: (1) as mycelium in the leaves, (2) as sclerotia developed from the mycelium, (3) as ascospores produced in the perithecia.

The remedies suggested are a solution of sulphide of potassium one ounce to eight gallons of water. Also the copper solutions. Burning of all spotted leaves which may carry the disease over to the spring.

Known in Europe—in France, Germany, and Italy—as well as in the United States.

U.S.A. Exp. Sta. Cornell, xiv. Dec. 1889 ; *Sacc. Syll.* i. 1951 ; *Mass. Pl. Dis.* 107, fig. 18 ; *Tubeuf, Dis.* 215, fig.

Strawberry Mildew.

Sphærotheca humuli (DC.).

A white mould on Strawberries was recognised by Berkeley in 1854, when he imagined it was the same species as had been known on Turnips. Afterwards the occurrence of the same mildew in America led to its further investigation, and it was discovered at length to be none other

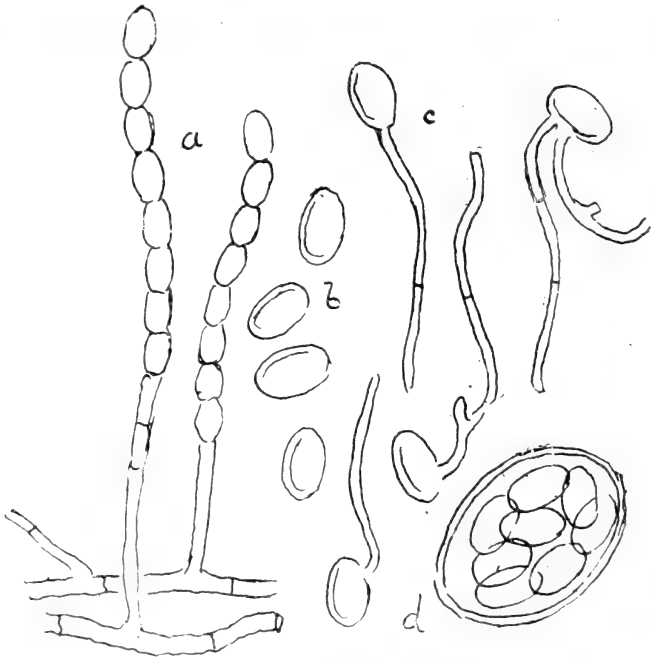


Fig. 10.—Sphærotheca humuli.

a. Conidiophores. (× 200.) *b*. Conidia germinating. (× 300.) *d*. Asci and spores. (× 350.)

than a form of the well-known mildew of the Hop. In this country only the conidial condition had been seen, which was a simple *Oidium*, somewhat like that of the Vine. On the other hand the perfect fruit was found in America, so that between 1892 and 1898 it became established that the fungus of the Strawberry mildew was that known as *Sphærotheca humuli* (or, as formerly termed, *Sphærotheca Castagnei*), the cause of the Hop mildew. (Fig. 10.)

In the first stage it attacks the leaves, causing them to curl, so as to appear as if suffering for lack of water. At this time the mycelium spreads over the under surface as a white felted mould, from which arise the short branches which bear the chains of conidia (30–35 × 20–24 μ).

The mycelium sends suckers into the epidermal cells of the leaf whence to obtain nourishment. Subsequently to its appearance on the leaves the mildew spreads afterwards into contact with the fruit.

Later in the season the second form of fruit is developed, after the manner of the Rose mildew, Pea mildew, and others of its kind. These are in the form of minute globose conceptacles, which become dotted over the mycelium, each containing a single ascus which encloses eight sporidia.

These conceptacles are only sparingly produced, and those generally occur on the petioles of the leaves, and, like those of the vine mildew, perhaps in this country not at all. Doubtless the mildew is increasing with us, and complaints are being heard of it in Strawberry-growing localities. Some varieties stand the chances much better than others.

Predisposing circumstances are affirmed to be sudden changes of temperature, especially a decrease during the night or a cool temperature followed by sunny weather.

Experiments made by two fungicides seemed to afford satisfaction, viz. (1) one ounce of carbonate of copper and five ounces of carbonate of ammonia dissolved in a quart of hot water and then mixed with sixteen gallons of water when cold. (2) Dissolving a quarter of an ounce of sulphide of potassium in a gallon of water. Spraying with either of these mixtures is therefore recommended, especially the first; but promptitude must be used whilst the mildew is on the leaves, since it is useless when it has obtained a hold upon the fruit to attempt to save the crop.

Sacc. Syll. i. 8; *Cooke Hdbk.* No. 1911; *Berk. Gard. Chron.* 1854, p. 236; *Journ. R.H.S.* xxv. (1900), p. 132, figs. 35, 36.

EXPLANATION OF PLATES X., XI., XII.

FIG. 1.—*Septoria pyricola*, Desm.—Spotted leaf, section of perithecium and sporules × 400

2.—*Oidium farinosum*, Cooke.—Young leaves with mould; chains of conidia, and free conidia × 400.

3.—*Fusicladium dendriticum*, Wallr.—On Apple with threads and conidia × 400.

4.—*Glœosporium fructigenum*, Berk.—Spots on Apple with conidia × 400.

5.—*Botryodiplodia pyrenophora*, Sacc.—On Apple twig; *a*, young conidia; *b*, mature conidia × 400

6.—*Nectria ditissima*, Tul.—Forming canker on branch; *a*, fissure showing fungus; *b*, perithecia, magnified; *c*, sporidia × 400.

7.—*Valsa ambiens*, Fr.—Pustules on branch; *a*, conidia oozing in a tendril; *b*, conidia × 400; *c*, asci and sporidia × 400.

8.—*Rœstelia cancellata*, Reb.—On Pear leaf, with receptacle and spores.

9.—*Exoascus bullatus*, Tul.—On Pear leaf, with ascus and sporidia × 400.

10.—*Entomosporium maculatum*, Lev.—Spotted leaf with conidia × 400

11.—*Fusicladium pirinum*, Lib.—On Pear leaf, with threads and conidia × 400.

12.—*Monilia fructigena*, Pers.—Tufts of mould on fruit; *a*, section of tuft; *b*, thread and conidia × 400.

13.—*Exoascus pruni*, Fckl.—Diseased fruits; *a*, asci with sporidia × 400.

14.—*Polystigma rubra*, Pers.—On Sloe leaf; *a*, section of blotch; *b*, conidia; *c*, ascus and sporidia × 400.

15.—*Puccinia pruni*, Pers.—On Plum leaf; *a*, uredospores; *b*, teleutospores × 400.

16.—*Podosphæra tridactyla*, Wall.—Conceptacle with fulcra, enlarged; *a*, ascus and sporidia × 400.

17.—*Uncinula prunastri*, DC.—Leaf with mould, and conceptacle, enlarged; *a*, tip of appendage; *b*, ascus and sporidia × 400.

18.—*Cladosporium epiphyllum*, Link.—Nodules of gum on twig. Threads and conidia × 400.

19.—*Gnomonia erythrostoma*, Awd.—Spots on Cherry leaf; *a*, section of conceptacle; *b*, conidia; *c*, section of perithecium; *d*, sporidia × 400.
20.—*Glœosporium læticolor*, Berk.—Spot on fruit; *a*, conidia × 400.
21.—*Uromyces amygdali*, Pass.—Rust on Peach leaf; *a*, spots enlarged; *b*, teleutospores × 400.
22.—*Coryneum Beijerinckii*, Oud.—Pustule with conidia × 400.
23.—*Exoascus deformans*, Berk.—Curl on Peach leaf; *a*, section of blister, enlarged; *b*, ascus and sporidia × 400.
24.—*Helminthosporium rhabdiferum*, Berk.—Conidia × 400.
25.—*Micrococcus amylovorus*, Burr.—Families, and sporules × 400.
26.—*Marsonia juglandis*, Lib.—On Walnut leaf; *b*, section of pustule; *a*, conidia × 400.
28.—*Phleospora mori*, Lev.—On Mulberry leaf, with conidia × 400.
29.—*Cercospora moricola*, Cooke.—On Mulberry leaf with threads and conidia × 400.
30.—*Clasterosporum parasiticum*, Cooke.—Conidia × 400.
31.—*Septoria ribis*, Desm.—On Currant leaf; *a*, section of receptacle; *b*, conidia × 400.
32.—*Glœosporium ribis*, Lib.—On Currant leaf; *a*, conidia × 400.
33.—*Æcidium grossulariæ*, Gmel.—Cluster on Gooseberry leaf; *a*, cluster-cup; *b*, æcidiospores × 400.
34.—*Microsphæra grossulariæ*, Lev.—Conceptacle with appendages enlarged, tip of appendage further magnified.
35.—*Phyllosticta pallor*, Berk.—Spots on Raspberry cane; *a*, section of perithecium; *b*, sporules × 400.
36.—*Glœosporium venetum*, Speg.—Spots on Raspberry cane; *a*, section of pustule; *b*, conidia × 400.
38.—*Phyllosticta fragaricola*, Desm.—Spots on Strawberry leaflet; *a*, sporules × 400.
39.—*Septoria fragariæ*, Desm.—Spots on Strawberry leaflet, with section of perithecium and sporules × 400.
40.—*Glœosporium fragariæ*, Lib.—Spots on Strawberry leaflet, with pustule enlarged and conidia × 400.
41.—*Ramularia Tulasnei*, Sacc.—Spots on Strawberry leaflet, with threads and conidia × 400.
42.—*Sphærella fragariæ*, Sacc.—Ascus and sporidia × 400.

ON THE USE OF ETHER AND CHLOROFORM FOR THE FORCING OF SHRUBS, AND OF LILACS IN PARTICULAR.

By Emile Lemoine, F.R.H.S.

For some years there have often been questions in the horticultural papers about the forcing of plants with the aid of ether, and a certain number of experiments have been made in different countries with a view of utilising this new process. It is not my intention to communicate to you the result of my own personal experiences, but I think an account of the principal work done as regards the action of ether and chloroform on plant life may perhaps be of interest. Most of these experiments are given in the German papers, *Gartenflora* and *Möller's Gärtnerzeitung*, and in the French *Le Jardin*, and many other horticultural papers have reproduced them. The inventor of this process, Dr. Johannsen, described his first experiences, and the theoretical idea suggested by them, in several Danish works, and in a treatise published in German in 1900 ; * more recently Mons. Albert Maumené, professor of horticulture at Paris, has summed up in an interesting little book † the actual state of the question.

The action of anæsthetics on vegetable life was formerly studied by Claude Bernard, who, wishing to record the phenomena common to animal and plant life, submitted both to the action of anæsthetics such as ether and chloroform ; thus he put under a bell-glass a specimen of the Sensitive Plant (*Mimosa pudica*) with a small sponge dipped in ether : at the end of twenty to twenty-five minutes the leaves, being expanded, had become insensible, and no longer shut themselves up when touched ; when replaced in a normal atmosphere the Sensitive Plant recovered its sensibility at the end of a more or less lengthy period. For Claude Bernard this experiment had no other interest than to prove the identity of the characteristics of the protoplasm in the vegetable kingdom with that of the animal, since the effect of anæsthetics was the same in both kingdoms.

Inspired by the researches of Claude Bernard, Dr. W. Johannsen, professor at the Danish High School of Agriculture, tried, in 1890, the effect of ether on plants, and on November 17, 1893, he was able to show at the Royal Academy of Sciences, Copenhagen, the first flowers of Lilac forced by means of etherisation. The following are the theoretical considerations by which Dr. Johannsen was induced to undertake his experiments.

One recognises in the greater number of plants a period of repose, more or less marked, and another of active growth. The period of repose is produced by internal causes which have, so far, escaped the researches

* *Das Aetherverfahren beim Frühtreiben, mit besonderer Berücksichtigung der Fliedertreiberei*, Jena, 1900.

† *Nouvelle Méthode de Culture forcée des arbustes et des plantes soumis à l'action de l'éther et du chloroforme*, Paris, 1903.

of *savants*; at the same time it is influenced by external causes which are easier to determine. Thus in autumn, during the period of rest, the bud of a tree is formed from internal causes inherent in the vegetable nature; but until the following spring external influences (cold, for example) act upon it, so that it does not stir, but remains inert. If at the same time of year this external action be removed, either from the cessation of the cold or from our placing the bud in a warm room, it will awake little by little and begin to push.

It is generally known that if a tree, for any reason, has lost its leaves in the summer its buds, which in the ordinary way would not push until the following spring, sometimes develop during the autumn. It is thus that you often see certain Lilac bushes flower again in the month of August, and perhaps more frequently Horse Chestnuts in September. In these cases the buds have not yet come to a state of complete rest when they are set pushing. Nevertheless this does not happen (save in exceptional cases) with a tree that has kept its leaves until the middle of the autumn. In this case the buds have had time to enter into a state of absolute rest, as far, at least, as it is permissible to employ the word absolute in such a sense. On the other hand, the nearer the period of rest approaches its end, the more easily will the flower-buds develop themselves.

From these considerations the Danish *savant* establishes three divisions during the period of rest, perhaps somewhat artificial: initial rest, complete rest, and final rest. In the first stage the faculty of development diminishes more and more; in the second it no longer exists; in the third it returns by slow degrees. Well, then, if a very severe drought occurring in the middle of the summer or intense cold arriving in the autumn can produce in the growth of trees or shrubs a complete check, or a still more profound state of rest, ether can also produce the same result; and etherisation has exactly the same effect in modifying the natural development of the plant, and the result resembles that which one observes in the open air in a tree that for some reason or other has lost its leaves early, viz. an abnormal and precocious growth. It may be supposed that flower-buds from their formation until the first days of September are in the *first* stage of rest; the second lasts from then until the end of October; from this time the third stage begins, and during the month of January comes to an end: the buds have virtually come out of their state of repose, or are only retained in it by the influence of the cold. It was during the first and last stages that the specimens of the Lilac 'Charles X.,' treated with ether, were brought into growth with a rapidity that was remarkable.

We now come to the working methods used by Dr. Johannsen. In a box capable of being hermetically closed were placed the shrubs to be experimented on. The plants, as dry as possible, were planted in a bed of equally dry sand. A moist soil or moist sand absorbed a certain amount of ether, and the effect of this, it was found by experience, was to diminish its action, or even, if the ether penetrated to the roots, to damage them. The temperature in the box ought to be about 17° to 19° C. (62° to 66° F.) At a higher temperature a less quantity of ether would be sufficient, but concerning its action at low temperatures we are

at present uninformed, but it would probably be nil. Under the cover of the box is suspended a small containing vessel into which the ether is poured through a hole in the top, which is at once hermetically closed, and the plants are then left to themselves. This position of the containing vessel is very important, as the vapour of ether being heavier than the air, it gravitates towards the bottom of the box, whereas it could not act on the higher branches if the containing vessel were placed at a lower level. Naturally this work is done in the day time, and away from any flame, as the vapour of ether is very inflammable and produces, in contact with the air, a mixture the explosion of which would be disastrous, and as terrible as that of firedamp. It is as well, then, never to approach the box with a lamp or even a cigar, and the heating apparatus should be at some distance. Thirty or forty grammes * of ether are enough for a hundred cubic litres † of air, and the time the plants are kept in the box is about forty-eight hours. This time, as well as the dose of ether, may be varied according to circumstances and the nature of the plants operated on: it may be advantageous to etherise them for forty-eight hours, then expose them to the air for forty-eight hours, and then treat them with ether again for forty-eight hours. The ether to be used is pure sulphuric ether, which boils at 35° C. (95° F.)

Immediately after this treatment the plants should be placed in a cold house, where they are treated in the usual manner. It is not very unusual for the buds to begin to push in the ether chamber. In every case the forcing will be more rapid, and require less heat, than under normal conditions. It was thus that Dr. Johannsen caused Lilacs that had been etherised in the first week in August to flower regularly during the first fortnight in September. With other shrubs, such as *Azalea mollis*, *Viburnum Opulus*, *Prunus triloba*, *Deutzia gracilis*, and some of the Spiræas, the results were more or less favourable.‡

After the experiments of Dr. Johannsen had been put into actual practice by Danish gardeners, they were closely followed by certain German florists. In 1899 Mons. H. Seyderhelm, a horticulturist at Hamburg, went to Copenhagen for the purpose of learning by ocular demonstration the method made use of by the Danish *savant*, and wrote to him the year after: "I am now convinced that your discovery for the forcing of flowers and shrubs is one of great importance to practical floriculture." §

Mons. Franz Ledieu, Inspector of the Dresden Botanical Garden, has described in the German paper *Gartenflora*, and afterwards in the French *Le Jardin*, some experiments made under his direction at the trial station of that garden. He says: "For early forcing the action of ether is of such importance that the great firms of shrub forcers will be obliged to introduce this method of cultivation. Flowers produced by early forcing, coming at a time when they are in great demand, find buyers at high prices. It should be remembered, moreover, that the economy of fuel realised by this method (since the forcing can be done at either a high or low temperature) is very marked, and thus covers the cost of etherisation." ‖

* A gramme = almost 15½ grains. † A litre = 61 cubic inches.
‡ *Bulletin de la Société centrale d'Horticulture de Nancy*, janv., fév., 1903.
§ A. Maumené, *Nouvelle Méthode de Culture forcée*, p. 43.
‖ *Le Jardin*, 1901.

It was proved from the experiments of Mons. Ledieu that—

1. The varieties of Lilacs usually forced in Germany, 'Marie Legraye,' 'Charles X.,' and 'Léon Simon,' were in full flower eighteen days after being placed in the greenhouse. The variety 'Marie Legraye' even expanded its flowers still earlier.

2. Different kinds of flowering shrubs were made to flower in a much shorter time than by the ordinary methods now in use. Plants of the same variety that had not been etherised did not flower at all, or flowered very badly in the comparative trials in early forcing, or at any rate opened their blossoms eight or ten days after those treated with ether.

3. The plants treated with ether could be forced at a lower temperature than that required by those not thus treated.

Hamburg is one of the largest centres for the forcing of Lilacs in Germany. One of the principal forcers of that city, Mons. Friedrich Harms, devoted himself to a series of experiments on the same subject the results of which fully satisfied him. He described them in an article, illustrated with some very instructive photographs, which appeared in *Möller's Gärtnerzeitung*. The conclusions that he drew from these experiments may be summed up as follows :—

1. Lilacs treated with ether force much more rapidly than the others.

2. In consequence of the ether treatment, some varieties of Lilacs which are known to be difficult to force can be forced with equal ease as 'Charles X.,' 'Marie Legraye,' &c., which are known as good subjects for forcing.

3. Some Lilacs not having been specially prepared for forcing, that is to say, plants taken up from the open ground with a ball of earth and etherised, and then put in a warm house, developed their flowers perfectly and very rapidly. *

The experiments made in France were chiefly made to confirm and prove the results obtained by the German gardeners, to try the action of other anæsthetics, and to draw from them theoretical and practical conclusions. Thus Mons. Charles Leblanc communicated to the Société centrale d'Horticulture de Nancy on April 13, 1902, the results of his researches. In a general way his trials confirmed the very important influence of ether vapour on forcing; but what made them far more interesting was that he turned his attention, not only to ether, but also to chloroform. He says :—

"My experiments were quite successful. On February 19 I chloroformed some plants of *Azalea mollis*, giving them a dose of half the quantity I should have used had it been ether. I left the plants forty-eight hours under the influence of the chloroform, and on February 21 I put them in a greenhouse at 18° C. (65° F.) From March 5 the flowers began to expand a little, and attained about to their full dimensions on the 8th, whereas plants grown for comparison were not expanded until March 21. Lilacs treated with the same amount of chloroform were a little retarded; as regards those not chloroformed, in my opinion, the amount given them was too strong." †

The trials made by Mons. Aymard, junior, a horticulturist at Mont-

* *Bulletin de la Société centrale d'Horticulture de Nancy*, 1901, p. 209.
† *Ibid.* 1902, pp. 38 and 40.

pellier, were described in *Le Jardin* by Mons. Albert Maumené: "We placed two Lilacs under a bell-glass for thirty-six hours in the vapour of ether, then we forced them, and effectively, since the untreated ones budded as usual and flowered on about the seventeenth day, whilst we found the etherised ones flowered about the thirteenth. There was also this remarkable fact to be noticed, that the ordinary untreated plants only produced flowers, whereas the etherised Lilacs were also covered with abundant leaves, and could thus have been sold as flowering and decorative plants. These experiments were repeated five times with the same successful results.

"I submitted Lilacs and Lilies of the Valley to the action of chloroform, and have established the following results:—When the Lilacs were taken out of the bell-glass in which they were treated they looked very miserable. Chloroform, it is known, absorbs a great deal of water, and it had to a certain extent dried up the plants. They were nevertheless put in the forcing-house; in course of time they recovered, and in the end were as fine as those not chloroformed. As to the Lilies of the Valley, they were astonishing: they were not only better than the untreated ones, but also finer than those treated with ether." *

Mons. Aymard also experimented with other anæsthetics and stimulants. The results which he obtained, although very interesting, do not suggest any new practical method of forcing.

Experiments have also been made in England, as we learn from the *Times* of January 16 last, and from the *Horticultural Trade Journal*, in an article of which the following is the conclusion:—"So far as England is concerned, at least one grower has tested, on an extensive scale, the value of the etherisation of plants. Mr. T. Jannoch, of Dersingham, near Sandringham, immediately on hearing the discovery, had a special ether chamber or tank made, and the results of his experiments, which I have been permitted to examine carefully, are far beyond any reasonable anticipations. Next season Mr. Jannoch, doubtless in common with other cultivators who have tested the system, has determined to enter into yet more extensive experiments." †

What conclusions can be drawn from all these experiments? It appears quite legitimate to assume that the vapour of ether has a great influence on the rapidity and ease of forcing shrubs; but this influence is only of real importance for early forcing, that is to say, before Christmas, because after that date the shrubs cultivated for this purpose can generally be forced very easily without the use of anæsthetics. On the other hand, for the forcer to obtain the full advantage of etherisation he ought to have a large chamber constructed and make it absolutely air-tight, because not only would the least leakage tend to counteract the influence of the ether, but might give rise to fires or explosions. Moreover, as I have said already, the manipulations must all be made in the daytime, because to go near the ether chamber with a lamp or a cigar is sufficient to cause a frightful explosion. This danger is a very real one, and I am certain it will dissuade not a few from using this new method of forcing.

Chloroform does not present the same dangers, but its success has not

* *Le Jardin*, 1902, p. 251.
† The *Horticultural Trade Journal*, Jan. 21, 1903.

yet been proved in so definite a manner. From the results obtained it appears that chloroform ought to be employed in much smaller quantities than ether—a third or four part, for instance— for I understand that Mons. Leblanc, by employing about twenty grammes of chloroform for a hundred litres of air, did not obtain any particular results with Lilacs, and that Mons. Aymard, by using the same quantity of chloroform as of ether, nearly lost all his Lilacs, although the Lilies of the Valley, treated in the same way, were a wonderful success. One can perfectly understand that the buds of Lilies of the Valley, like the bulbs of Hyacinths, Tulips, &c., being enveloped in a great thickness of tissues, require a larger quantity of the vapour of ether or chlofororm to penetrate to them than the buds of Lilac or Azalea, which are protected by quite thin scales.

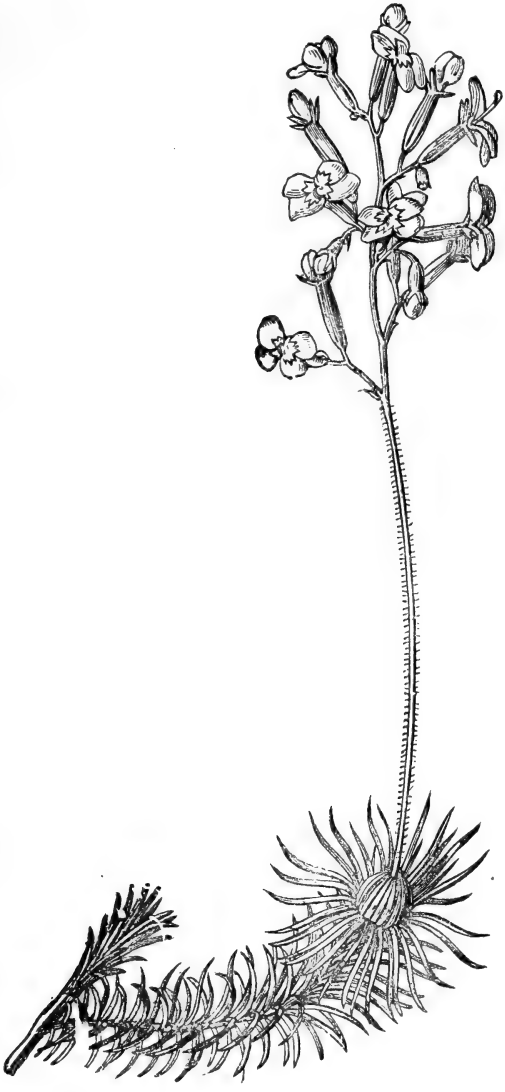
It may also be asked, to what is the influence of ether and chloroform on plants to be attributed? These two substances are anæsthetics, that is to say, their vapour produces insensibility in animals, and in time suppresses all movements indirectly caused by sensation; it produces a sleepiness, a numbness, an intoxication; and, according to Professor Johannsen, such is also its action on plants: it renders their vital power latent; it makes their repose and their sleep far deeper; and to exactly the same extent that these lose in duration do they gain in intensity, and the more easy and rapid is their recovery. But can it be said that the plant has been anæstheticised? When a Sensitive Plant is treated in this manner everything happens in the same way as when an animal is anæstheticised; the mobility of the plant is for the moment destroyed; but who would venture to assert that sensibility, that is to say, sensation, exists in the *Mimosa*, and that it has been abolished? This is a hair-splitting of words you will say; but nevertheless there may be some common sense in it. Dr. Raphael Dubois, who also studied the action of anæsthetics on plants, wrote: "These anæsthetic vapours will produce very marked modification of the tissues exactly corresponding to those caused by the action of frost. . . . It is a general law that not only do almost all anæsthetics hinder the absorption of water by the cellular tissues, but also that they tend to deprive them of part of the water which they already contain. If you put any fleshy plants, such as *Echeveria*, into a closed vessel in contact with the vapour of ether they will, after a certain time, exude large drops of water through the epidermis. . . . It is curious to find that the most noticeable action of anæsthetics is generally closely allied to that of cold, which also hinders the absorption of water and produces in frozen earth its separation &c. But cold, as is well known, is an anæsthetic." *

We know that a spell of cold or of very dry weather greatly assists the subsequent forcing of plants that have been subjected to their action. May we not attribute the influence of ether and chloroform to their drying powers, drying up and coagulating the protoplasm and the food reserve contained in the stems, and still more at the base of the buds, in the same way as cold or great drought does? Or just as Alpine plants which have been for a long time benumbed under the snow speedily recover and begin to flower as soon as a ray of sunlight arrives to melt it, so flowering branches, coagulated, dried up, and rendered torpid by ether or chloro-

* Dr. Raphael Dubois, quoted in *Le Jardin*, 1902, p. 12.

form, commence to flower as soon as they have a little warmth and moisture given to them, and that the more rapidly since the effect of the anæsthetic has been more energetic? Thus one can say with Professor Le Monnier, Director of the Botanical Garden of Nancy, that ether and chloroform act like stimulants to the reserve of growth stored up round about the buds.

If, then, anæsthetics act by the powers they possess of removing the water contained in the vegetable tissues, would it not be possible to substitute for them some other substances, known for their properties of removing dampness, such as chloride of calcium, quicklime, and other harmless products?



NOTES ON LITTLE-KNOWN TREES AND SHRUBS.

By George Nicholson, V.M.H.

There are so many trees and shrubs which are rarely seen except in botanical establishments pure and simple, or only now and then in the gardens of those who make them a special study, that it is quite impossible within the limits of a single paper to do more than call attention to a mere selection of the most distinct species or those most desirable from the point of view of ornament. As Mr. J. H. Veitch has written another paper dealing, I presume, with the recent introductions of his firm, I have purposely omitted many remarkable species which I have reason to believe will be fully treated by him. Not a few of the plants mentioned below are by no means new—some are decidedly old—but all are both interesting and beautiful, and worthy of more extensive cultivation.

Berberis congestiflora var. *hakeoides* is a native of the Cordillera of Chili, whence it was introduced by Veitch in 1861. An excellent figure of it was published in the "Botanical Magazine," t. 6770. It is quite unlike any other Berberry in cultivation: it makes a large bush with decurved branches loaded with globose masses of flowers, some of which are sessile in the axils of the leaves, many more form consecutive heads, sessile on the long leafless terminations of the branches, which gives the shrub a very singular appearance. The colour of the flower is golden yellow; the species is quite hardy. A large specimen in the garden of Rev. Canon Ellacombe is, I am told, worth a journey to Bitton to see.

B. dictyophylla.—This is a much more recent discovery: it was first found by Père Delavay at an elevation of 3,000 ft. on Fanyangshan in Yunnan, and was first cultivated and distributed by Mons. Maurice L. de Vilmorin in 1897. It makes a charming bush of somewhat compact habit: the pale yellow flowers are borne in May, singly or in pairs, in the axils of the leaves; the fruits are bright red. As a species it comes nearest to the Himalayan *B. angulosa*: it is apparently quite hardy.

Azara Gilliesii.—This is the handsomest member of the genus. In the neighbourhood of London it cannot be trusted to maintain itself as an ordinary shrubbery plant, but it does well against a wall. In many places along the south and west of England it would doubtless thrive perfectly in the shrubbery. It has Holly-like evergreen leaves and minute flowers collected into oblong heads resembling golden catkins, from the numerous rich orange-coloured stamens.

Bursaria spinosa.—This member of the *Pittosporaceæ* will do as a wall plant near London, but in more favoured spots makes a handsome bush in the shrubbery. There is a fine specimen in Canon Ellacombe's garden at Bitton: the terminal panicles of small white flowers followed by the pretty fruits are decidedly showy. Introduced from New South Wales in 1793 by the Marchioness of Rockingham.

Tamarix hispida var. *kashgarica.*—A native of Central Asia with spikes of bright rose-coloured flowers: it was raised by Mons. Lemoine of

Nancy in 1893 from seeds collected near Kashgar by the Russian traveller Roborowsky, and was first flowered at the Château du Crest by the late Mons. Marc Micheli. A handsome Tamarisk, figured in the "Revue Horticole," 1901, p. 379, under the name of *T. hispida* var. *æstivalis*, is apparently a form of *T. Pallasii*, and is certainly not any form of *T. hispida*.

Stuartia Pseudo-camellia.—This Japanese member of the Camellia family is an erect-growing handsome deciduous shrub with axillary, solitary, globose white flowers, about two inches in diameter, and orange-red anthers.

S. pentagyna is a native of the mountains of Carolina and Georgia, and was first cultivated at Kew long before 1785. The bushes have a truly beautiful appearance when in flower; the petals are creamy white above and tinged with red on the outside; the anthers are yellow.

S. virginica has even larger flowers than *S. pentagyna*: they measure 2 to 3 inches across, and the stamens are purple: it is a native of Florida, North Carolina, &c. Half a century ago the two last-mentioned species were not unfrequent in English gardens; and in old-fashioned gardens, where no attempt has been made to remove or transplant them, fine bushes still exist.

Gordonia Lasianthus.—The "Loblolly Bay" is a native of the Southern United States. According to Sargent's "Silva of North America" it attains a height of from 60 to 75 feet with a straight trunk 18 to 20 inches in diameter: the flowers measure nearly 3 inches across. Attempts should be made to grow this magnificent tree on the south-west coast &c. An early volume of the "Botanical Magazine" records its flowering under glass at Clapham in 1769, and in "Hortus Collinsonianus" the following mem. occurs: "Loblolly Bay flowered at Mr. Greening's, at Esher, Aug. 1765—I believe the first."

G. pubescens grows about 15 feet or 20 feet high. It has large white flowers and yellow anthers, and is a very handsome shrub. From Sargent's "Silva" we learn that the species was discovered by John Bartram in 1765 on the Altamaha River in Georgia, occupying with *Pinckneya pubens* an area of two or three acres. W. Bartram, who accompanied his father during his 1765 journey, revisited the locality in 1775, and again in 1778, and collected roots and seeds. No botanist since 1790 has seen plant growing wild, and all efforts to find it in original locality elsewhere have proved unsuccessful. I have seen the plant in Fairmount Park, Philadelphia, flowering profusely, and last year also in the Arnold Arboretum at Boston. This would doubtless thrive in the open in some favoured spots in the south-west of England.

Plagianthus Lyallii.—This beautiful member of the Mallow family is a native of New Zealand, where it occurs in mountainous districts at elevations of from 2,000 to 4,000 feet, and attains a height of 20 to 30 feet. The drooping long-stalked flowers are produced in axillary fascicles of from three to five, measure from an inch to an inch and a half in diameter, and have white petals, yellow anthers, and pink styles. Near London it flowers profusely against a wall. In sheltered places nearer the sea it would probably succeed in the open.

Ilex verticillata.—The Black Alder, or Winterberry, of North America

is rarely seen in English gardens. In a wild state it occurs in swamps from Nova Scotia to Florida, grows from 6 to 25 feet in height, and has bright red berries clustered so as to appear verticillate. In autumn the decaying leaves turn black. There is a form in cultivation with golden yellow berries, and now and then white-fruited forms are met with in a wild state.

Cyrilla racemiflora.—The Southern Leatherwood or Ironwood is a shrub or small tree sometimes in its native habitats attaining a height of 35 feet, with a trunk 15 inches in diameter: it occurs along streams and swamps from South Virginia to Florida and Texas, mostly near the coast. It has narrow racemes, 2 to 6 inches long, with very numerous small white flowers. I have seen this flowering freely in the south of England.

Euonymus alatus.—This Japanese species is not showy in flower or fruit, but its winged branches are striking, and the brilliant colouring of the decaying leaves in autumn especially so.

Ceanothus papillosus.—This Californian plant was discovered by Douglas when collecting for Messrs. Veitch: it has handsome bright blue flowers and papillose leaves.

C. thyrsiflorus.—The Blue Myrtle, or California Lilac, is a native of the mountainous regions of Western California. Under favourable conditions it attains a height of 35 feet: it grows best in the Douglas Fir and Redwood region; along wind-swept coasts it only gets a foot or two high. Both *C. Veitchianus* and *C. Lobbianus*, long regarded as distinct species, are now believed to be natural hybrids of which one of the parents is *C. thyrsiflorus*.

Discaria serratifolia.—A spiny shrub or small tree, a native of Chili, quite hardy in the neighbourhood of London, at any rate. A figure appeared in the *Gardeners' Chronicle*, vi. 1876, p. 325, and the plant was then strongly recommended. As the figure in question was made from Kew material and the plant furnishing it has never been injured by frost, and still flowers profusely every year, it is useless to insist further on its hardiness. In June the bushes are sheeted with myriads of small fragrant white blossoms.

Æsculus indica.—The Indian Horse Chestnut is a lofty and not less ornamental tree than the common Horse Chestnut: it is a native of Kumaon &c., where it occurs at elevations from 8,000 to 10,000 feet above sea level. The petals are white, the two upper ones having a blotch of red and yellow at the base. It may be not out of place here to say that the ordinary Horse Chestnut is a native of the mountains of Greece, and that it is not a Central Asian plant, as stated in so many books.

Coriaria japonica.—The coral-red flowering and fruiting petals of this are very pretty but poisonous, like those of the European species, *C. myrtifolia*, the Redoul of the Mediterranean region. *C. japonica* is, however, much hardier than *C. myrtifolia*.

Adenocarpus decorticans. This grows in the mountains of Granada in company with *Abies Pinsapo*. It looks like the Common Gorse, but is quite spineless, and makes a very compact bush, a foot or two high, covered with yellow Laburnum-like flowers. Like so many of the

Leguminosæ, this is probably not a long-lived plant; we believe it, however, to be quite hardy near London.

Erinacea pungens.—Like the last this is a native of Spain. It was cultivated by Philip Miller in 1759, and was figured in one of the earlier volumes of the "Botanical Magazine." It is a dense, low-growing, compact, spiny shrub with large blue flowers. There ought to be a clump or two of this in the rockery, where it would not run the risk of being removed or tampered with. It is a very beautiful shrub. The first time I saw it in cultivation was in Canon Ellacombe's wonderful garden at Bitton.

Cytisus kewensis.—As implied by the name, this charming shrub originated at Kew some years ago: it is a hybrid between the little golden-yellow early-flowering *C. Ardoini* and the common white Spanish Broom, *C. albus*, the former being the seed parent. The flowers of *C. kewensis* are a creamy white, and the plant is prostrate in habit: it makes an excellent effect in the rockery.

Ononis fruticosa.—A very old garden plant cultivated by Philip Miller in 1748: it should have a place in the rockery, where it is likely to thrive better than in the shrubbery proper.

O. aragonensis is a native of Northern Spain, and is an admirable rockery shrub: it makes a compact bush laden with upright racemes of yellow flowers.

Robinia neo-mexicana.—This is a comparatively new introduction: it is the western representative of the eastern *R. viscosa*, a native of Carolina, which Sargent in his "Silva of North America" states is one of the rarest trees of the United States. *R. neo-mexicana* reaches the eastern slopes of the Rocky Mountains, and is found at elevations of from 4,000 to 7,000 feet. It flowers in June and bears short dense racemes of pale rose-pink flowers followed by pods thickly clothed with rigid bristles and gland-tipped hairs. Very often, as is also the case with *R. viscosa*, a second crop of flowers is produced in autumn.

Notospartium Carmichaeliæ.—The pink Broom of the residents of the Middle Island, New Zealand, is a shrub or small tree attaining a height of 20 feet, with weeping cord-like leafless branches and short racemes of bright pink-purple flowers. Like the majority of New Zealand shrubs this is hardly to be depended on near London in the open shrubbery, but does well against a wall. Further south it would doubtless succeed better.

Caragana aurantiaca.—Amongst the dwarf deciduous *Leguminosæ* there are few more beautiful flowering shrubs than this. It is perfectly hardy, grows almost under any conditions as to soil or situation, and bears an abundance of its showy orange-yellow flowers. Probably a native of Central Asia.

Sophora viciifolia.—The contrast between the violet-blue calyx and the cream-white corollas of this plant is very striking: it is a beautiful little bush recently introduced from China. In a wild state it grows from 2 feet to 4 feet high, and on the Tibet frontier occurs at elevations of from 9,000 feet to 13,500 feet above the level of the sea.

Prunus subhirtella.—This beautiful Japanese shrub or small tree was sent to Kew from the Arnold Arboretum some few years ago. In the middle of March this year a specimen in the Kew collection was a sheet of

milky-white flowers: this is apparently hardier, a freer grower, and more profuse flowerer than *P. pendula*, which is so fine in the United States. There is no doubt that *P. subhirtella* is one of the most ornamental of all the Japanese species of the genus.

Spiræa Aitchisonii, a native of Afghanistan, is a near ally of the Himalayan *S. Lindleyana*, but hardier and with individual flowers, larger in size; the pinnate leaves too are a different shade of green, and the bark of the young shoots is a purplish red.

S. bracteata is one of the handsomest of the Japanese Spiræas: it has hemispheric heads of large white sweet-scented flowers with conspicuously large discs.

S. Millefolium is a Californian species, remarkable for emitting an odour of creosote. On the Sierra Nevada it is found at elevations up to 10,000 feet. It is a most distinct plant with very closely pinnatisect leaves clothed with minute stellar pubescence and glandular hairs and large white flowers in erect terminal branching panicles.

Eucryphia pinnatifolia.—A rare Chilian tree, about 10 feet high, introduced by Messrs. Veitch many years ago from the Cordillera of Concepcion. The pure-white flowers are about 2½ inches across.

Rubus palmatus.—This handsome bramble is a native of Japan and China, and was introduced to cultivation by Messrs. Veitch about 1898. It is a glabrous much branched shrub with slender climbing branches, palmately five to six lobed leaves, and axillary white Clematis-like flowers, an inch or an inch and a half in diameter. For planting out as a climber in an unheated house or corridor it does splendidly.

Cotoneaster pannosa and *C. Francheti* are two distinct species from Yunnan. The latter is even more ornamental than *C. pannosa*: it was introduced to cultivation by Mons. Maurice L. de Vilmorin. *C. pannosa* has white flowers and globose fruits with two stones, whilst *C. Francheti* has pink tinted flowers and oblong fruits with three stones. Both have greyish woolly leaves, and are quite hardy.

Schizophragma hydrangeoides.—Nearly invariably in English and also Continental gardens the plant which goes under this name is *Hydrangea petiolaris*, which is well figured in the "Botanical Magazine," t 6788. In habit the two plants are very much alike: both ramble or climb amongst rocks or old trees, and root here and there to attach themselves. But in the true *Schizophragma* apparently only one lobe of the sterile floret is developed, and so in flower the plant is abundantly distinct from the *Hydrangea*. We believe that Messrs. Veitch have the true plant, also a new and desirable species not yet distributed.

Parrotia Jacquemontiana.—A native of the Western Himalayan region, nearly allied to *Fothergilla*, but with a globular involucrate inflorescence instead of a spicate exinvolucrate one. The whole plant is clothed with stellate hairs. It is a shrub or small tree flowering in spring before the leaves appear, and does not in autumn don the gorgeous colouring which characterises *P. persica*, the other member of the genus.

Aplopappus ericoides is a Californian composite with heath-like leaves and small light yellow flower-heads: it is a graceful and beautiful bush which requires the shelter of a wall near London, but thrives in the open along the south coast.

RECENTLY INTRODUCED TREES, SHRUBS, &c. FROM CENTRAL CHINA.

By James H. Veitch, F.L.S. &c.

In the spring of 1899 Sir William Thiselton-Dyer of Kew was kind enough to select a young man from the staff of the Royal Gardens who possessed, as far as could be judged, the necessary qualifications for undertaking a prolonged journey in certain districts of China.

The selection has proved a happy one, and the success of the venture so much beyond expectation that I have felt justified in despatching the young man in question (Mr. E. H. Wilson) on another trip to the Chinese-Tibetan frontier, some thousand miles further inland than he has been before.

In order that Wilson might be fully equipped for obtaining the best results from the neighbourhood he first visited—Ichang in the Yangtsze valley and Western Hupeh generally—and be conversant with the most striking of the trees and shrubs known to be in that district, some months were devoted to his visiting Professor Sargent in Boston and to finding Dr. Henry, at that time in the Chinese Customs service, and stationed at Sczemao in Yunnan, on the borders of Tonkin.

The necessity of consulting Dr. Henry and benefiting by his unrivalled knowledge of Chinese trees and shrubs—a knowledge freely imparted to Wilson—was so obvious that a year was devoted to this alone.

The journey to Sczemao *via* Tonkin proved arduous, and at one time the chance of reaching Dr. Henry by this route seemed hopeless; but the steadfast purpose of the young Kew student, of which on this as on other occasions he gave ample proof, enabled him to reach his destination.

After spending some weeks with Dr. Henry, who taught him much, Wilson left for Ichang *via* Hong Kong and Shanghai, and during the two succeeding years—1900 and 1901—sent home great quantities of seed, so carefully prepared that it practically all germinated.

During the three years that Wilson was absent he carried out his written instructions faithfully, and proved himself possessed of rare energy and an enviable capacity for solid work. His herbarium, numbering some fifteen thousand specimens, is most valuable, and now lies in the leading botanic centres of Europe and America. Photographic reproductions of some of the most striking specimens illustrate this paper, living plants of almost all being in cultivation in our Surrey nursery.

It is reasonable to suppose the great majority of the trees and shrubs referred to (and many others there is not space to touch on) will prove hardy in the British Isles, common as they are in a temperate zone and at considerable elevations. So far in England two winters and sixteen degrees of frost have permitted valuable tests to be made.

By far the most important from the horticultural standpoint among the flowering trees is *Davidia involucrata* (figs. 11 and 12), a remarkable

tree first made known to science in 1869 through Père David, after whom it was named by the French botanist Baillon.

It assumes a pyramidal form, 20–40 feet in height, somewhat resembling an unpruned Pear tree, producing spurs in a similar manner, on which the flowers are borne, though these in themselves are insignificant—in striking contrast to the magnificent pure-white bracts with which they are subtended. These are two in number, and vary from 4–8 in. in length by $1\frac{1}{2}$–$4\frac{1}{2}$ in. in breadth, broadly ovate in outline and acuminate, with irregularly serrated edges.

The leaves are handsome, cordate at base with serrate margins, dark green on the upper surface, slightly glaucous and glabrous beneath, and 4 in. broad by $4\frac{1}{2}$ in. long.

A tree in its native habitat when covered with the white bracts can be seen at a great distance amidst the dark green vegetation that clothes the mountain side, and as it slightly waves in the breeze resembles a moving pyramid of snow. Dr. Henry states: "The large white bracts, mingled with the green leaves of the tree, give it an extraordinary and beautiful appearance." Botanists differ somewhat in their opinions regarding the affinities of the plant, some placing it in *Cornaceæ* and others in *Hamamelidaceæ*.

In describing it in Hooker's "Icones Plantarum," tab. 1961, Prof. Oliver states: "From the conspicuous areolation of the receptacle of the inflorescence after the fall of the stamens and the circular disposition of the staminal cicatrices upon each areole I cannot but think the inflorescence is a capitulum of closely crowded achlamydeous male flowers with one obliquely lateral female one." This supposition can of course only be proved to be correct by a study of the embryology of the flowers. Cultivators, therefore, who first succeed in flowering *Davidia* will not only win laurels in the horticultural field, but will also greatly assist botanical science by supplying fresh material from which its affinities may be worked out and its place in the natural system defined.

Many thousands of this remarkable tree are growing and will shortly be distributed.

The *Ranunculus* family offer some useful additions to our herbaceous plants in *Aconitum Wilsoni* and *Aconitum Hemsleyanum*. The former (which flowers freely in Surrey) is a new species named by Dr. Stapf in honour of its discoverer, and is distinct in habit from any species at present in cultivation. The latter is a climbing species with large blue flowers, first discovered by Dr. Henry and named in compliment to the keeper of the herbarium at Kew. (Fig. 13.) The remarkable climbing habit of this species connects the genus with *Clematis*, to which it is allied.

Clematis is represented by several species, of which probably the best will prove to be *Clematis Armandi*, an evergreen species with trifoliate leaves and numerous white flowers, $2\frac{1}{2}$ in. in diameter, borne in corymbs in the axils of the leaves and terminating the branches. (Fig. 14.)

The *Magnoliaceæ* are represented by several genera, of which the type-genus *Magnolia* contains two species worthy of note, namely, *Magnolia Delavayi* and *Magnolia hypoleuca*.

Magnolia hypoleuca has already been introduced many years to British gardens by way of the United States from Japan, but is still

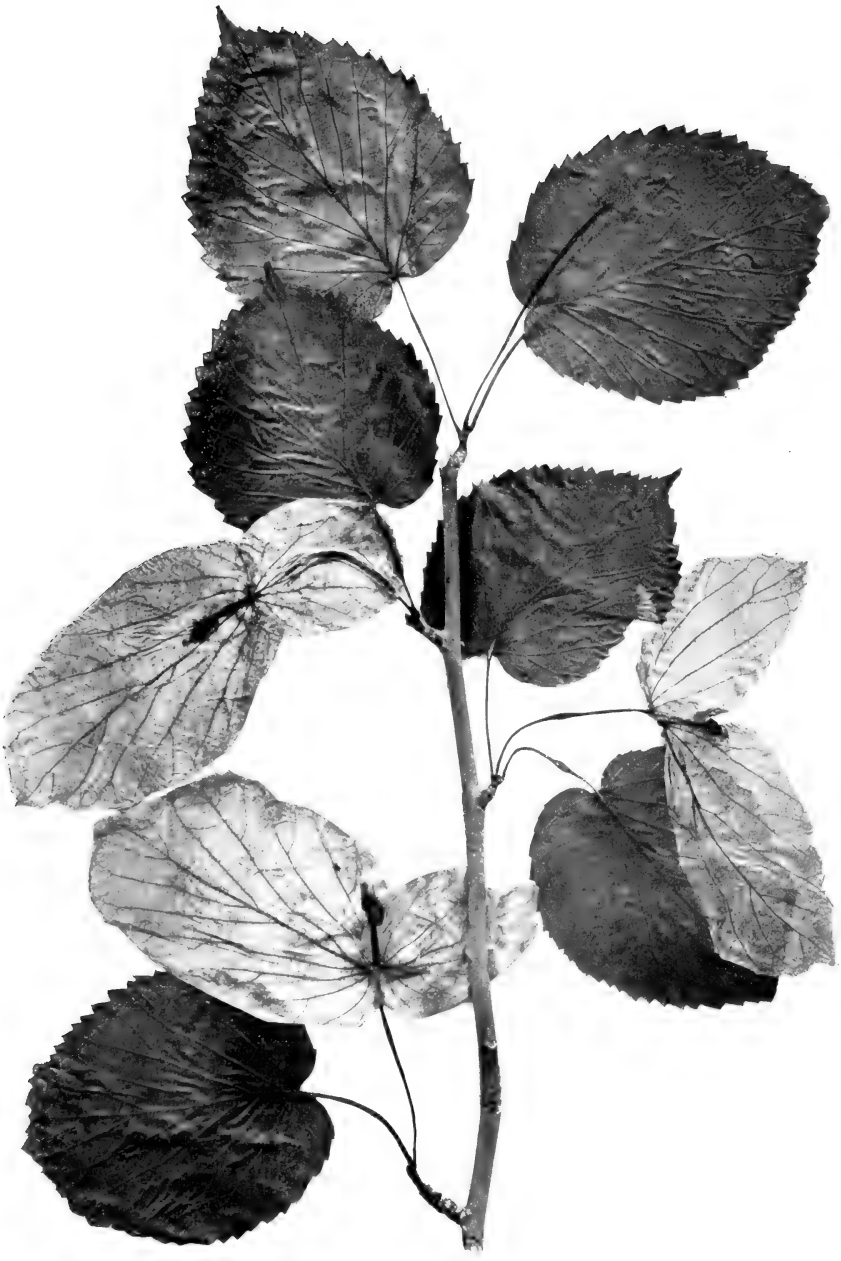


Fig. 11.—Davidia involucrata (*Baillon*).
(Leaves and bracts.)

Showing the dwarf branches from which the flowers and bracts are produced.

Fig. 12. Davidia involucrata (*Baillon*).
(Leaves and mature bracts.)
The bracts are $7\frac{1}{2}$ inches long by $4\frac{1}{2}$ inches broad.

Fig. 13.—Aconitum Hemsleyanum (*Diels*).
(Climbing Aconite.)

Flowers blue, disposed in terminal racemes 5 to 6 inches in length.

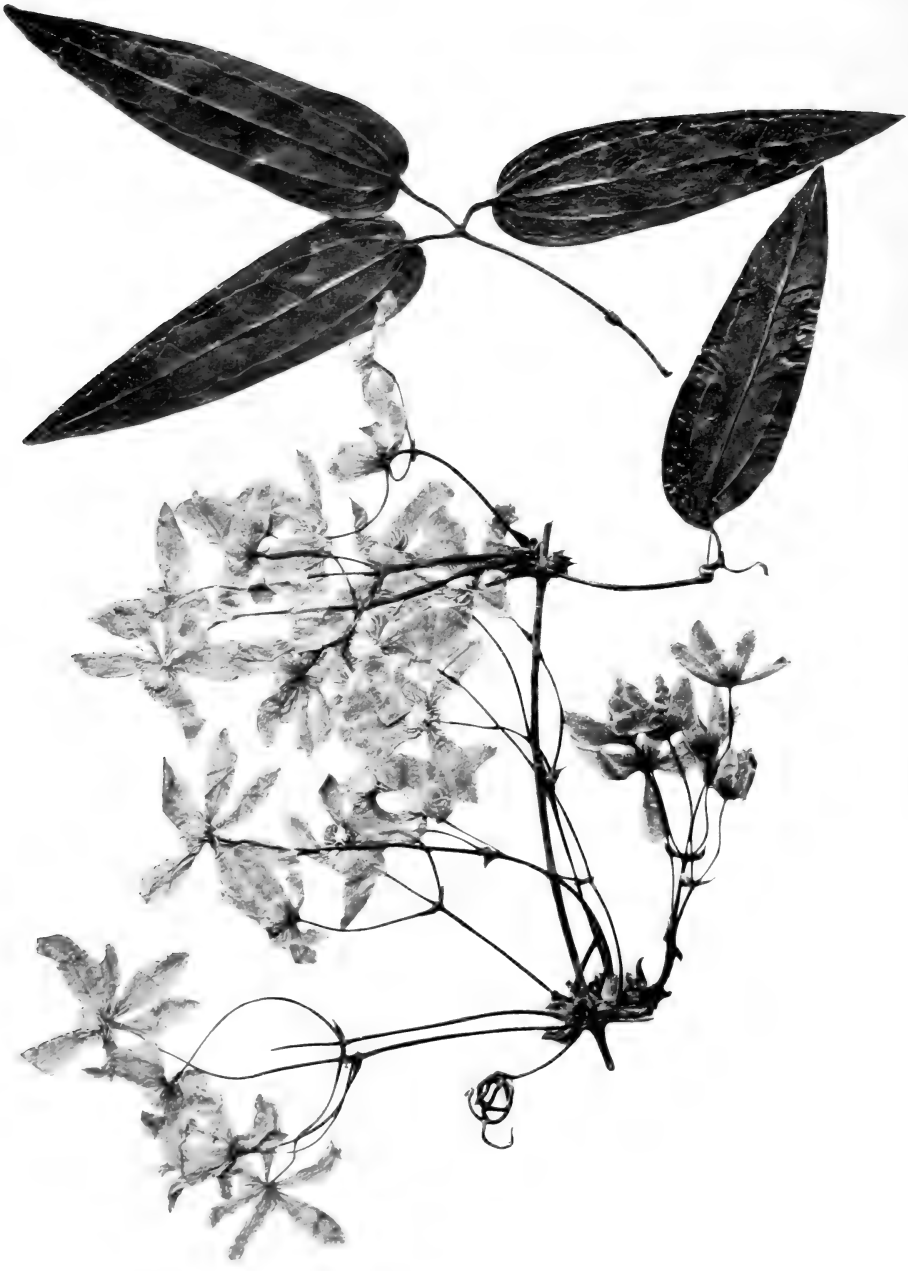


Fig. 14.—Clematis Armandi (*Franchet*).
Leaflets 5½ inches long by 1½ inch broad; flowers 2½ inches in diameter.

uncommon. Its cream-white flowers, delightful fragrance, and handsome foliage are well known to all who have visited the Japanese forests.

Magnolia Delavayi withstood the past winter uninjured, and promises in an unusual degree to be an addition to the hardy evergreen species of our gardens. It is figured in Franchet's "Plantæ Delavayanæ," where the flowers are represented as egg-shaped, of great substance, and pure white in colour.

Eucommia ulmoides is a rubber-producing plant, remarkable in that it adds another and distinct natural order containing plants yielding this important economic product, and in being indigenous to temperate regions, whereas the others are tropical. It is highly valued in Chinese materia medica, but the medicinal value, if any, is uncertain from a European standpoint.

Corydalis thalictrifolia is already known, having been exhibited on several occasions during the past year, and frequently figured in the horticultural press.

Two other species of this genus also promise well, especially *Corydalis tomentella*, with glaucous green leaves covered with a white tomentum, somewhat resembling Edelweiss; and another, appropriately named *Corydalis cheilanthifolia*, with leaves resembling a finely cut fern frond. This last-named species has withstood the past winter uninjured, and is apparently quite hardy, although the flowers are the most insignificant of the three species referred to.

Actinidia chinensis is by far the most important species of a genus which is represented in China by many of more or less horticultural value. (Fig. 15.)

The existence of this plant has long been known to science, specimens having been sent home by Fortune when travelling for the Royal Horticultural Society, and described by Planchon in Hooker's "London Journal of Botany," vol. vi. (1847), p. 303. It was also discovered by Maries when travelling for us in the North Island of Japan, and is mentioned by him in his letters to "The Garden," vol. xxi. (1882), p. 101. *Actinidia chinensis* has many claims on the gardener, having beautiful foliage, handsome and numerous flowers, and an edible fruit.

In habit a climber, with petiolate sub-orbicular leaves, $3\frac{1}{2}$–4 in. wide at their broadest part, $2\frac{1}{2}$ in. at their narrowest, dark green and glabrous on the upper, and densely tomentose on the under surface, and when first produced densely covered with red hairs. The flowers are borne in clusters on dwarf shoots and are $1\frac{1}{2}$ in. across, bright yellow in colour, inclosing numerous stamens. The fruit, about the size and shape of a Walnut, is covered with hairs in a varying degree of denseness: in flavour, so far as can be judged from Chinese preserves, it resembles ripe Gooseberries, and may prove, if freely produced in this country, a desirable hardy fruit. It grows freely in England.

Stuartia monogyna and *Camellia Grijsii*, also belonging to this family, are additions to our hardy shrubs.

Amongst several additions to the Hollies from China perhaps the most important is *Ilex Pernyi*, so named by Franchet in compliment to the French missionary, Paul Perny, who discovered it during his travels in China between the years 1850–1860. It is a very dense-growing

species, furnished with small, closely set leaves, 1 in. long by ¾ in. broad, and rigidly spinous. The berries are red and freely produced. For use as a hedge or shelter plant this Holly is eminently suited, as from its dense growth and rigid spines it positively defies penetration.

The genus *Vitis* is represented by many species, several of which promise to be of great horticultural value by reason of the elegant outline of their leaves and the brilliant tints assumed in the autumn months.

Vitis megaphylla (the Wonderful-leaved Vine) is remarkable in having bipinnate leaves, in this respect resembling the allied genus *Leea*. The leaflets are petiolate, 2–4 in. in length, ovate, with dentate margins. (Fig. 16.)

Vitis Romaneti is a handsome-leaved species with edible fruit, and *Vitis armata* has branches curiously beset with prickles. (Fig. 17.) *Vitis Thomsoni* has digitate leaves of a purple colour, and *Vitis leeoides* is also interesting. Amongst the most promising results of Wilson's journey are these Vines and several other valuable species at present unnamed.

The natural order *Sapindaceæ* is rich in shrubby plants belonging to favourite garden genera. The genus *Acer*, as might have been anticipated, contains the largest number of species. Dr. Henry states that during an excursion that he made in 1898 into the mountains he found sixteen distinct species, of which nine were new.

Of several growing at Coombe Wood new to cultivation, *Acer Henryi*, *Acer oblongum*, *Acer Franchcti* are amongst the most striking. These Maples formed the subject of several articles in the *Gardeners' Chronicle* during January 1903 from the pen of Dr. Henry.

Closely allied to *Acer* is the new genus *Dipteronia*, including two species, one of which, *Dipteronia sinensis*, is in cultivation at Coombe Wood, where it has withstood fifteen degrees of frost. In the mountain forests of Hupeh it attains a height of from ten to twelve feet. The leaves are impari-pinnate, with six to seven pairs of ovate-lanceolate, acute leaflets, glabrous or occasionally pubescent, with sharply serrated margins. The flowers are small, polygamous, and are borne in dense panicles terminating the branches. The fruits, freely produced, consist of two divergent carpels, which are connate at the base and furnished with a membranous wing all round the seed. A single carpel somewhat resembles the samara of the Wych Elm or of *Ptelea trifoliata*. The individual flowers are small, but, being produced in a dense panicle, showy. (Figs. 18 and 19.)

The order *Rosaceæ* is the richest numerically in genera and species of plants of horticultural interest, such genera as *Rubus*, *Cotoneaster*, *Pyrus*, *Spiræa*, *Rosa*, &c. being largely represented.

Cotoneaster species (No. 1384) is possibly the most valuable of this genus received. It is a shrub with ovate-lanceolate leaves, 2–2½ in. long, shortly petiolate, with entire margins, the upper surface strongly veined and slightly pilose, the lower covered with a dense woolly tomentum which gives it a white appearance.

The flowers are densely borne in corymbs terminating dwarf branches along the whole length of the shoot, and are followed by bright red fruits; altogether an unusually promising shrub.

The number of species of *Rubus* recorded from China reaches sixty or

Fig. 15.—Actinidia chinensis (*Planchon*).
(Leaves and flowers.)

Leaves $2\frac{3}{4}$ inches broad by $2\frac{1}{4}$ inches in length. Flowers yellow, $1\frac{1}{2}$ inch in diameter.

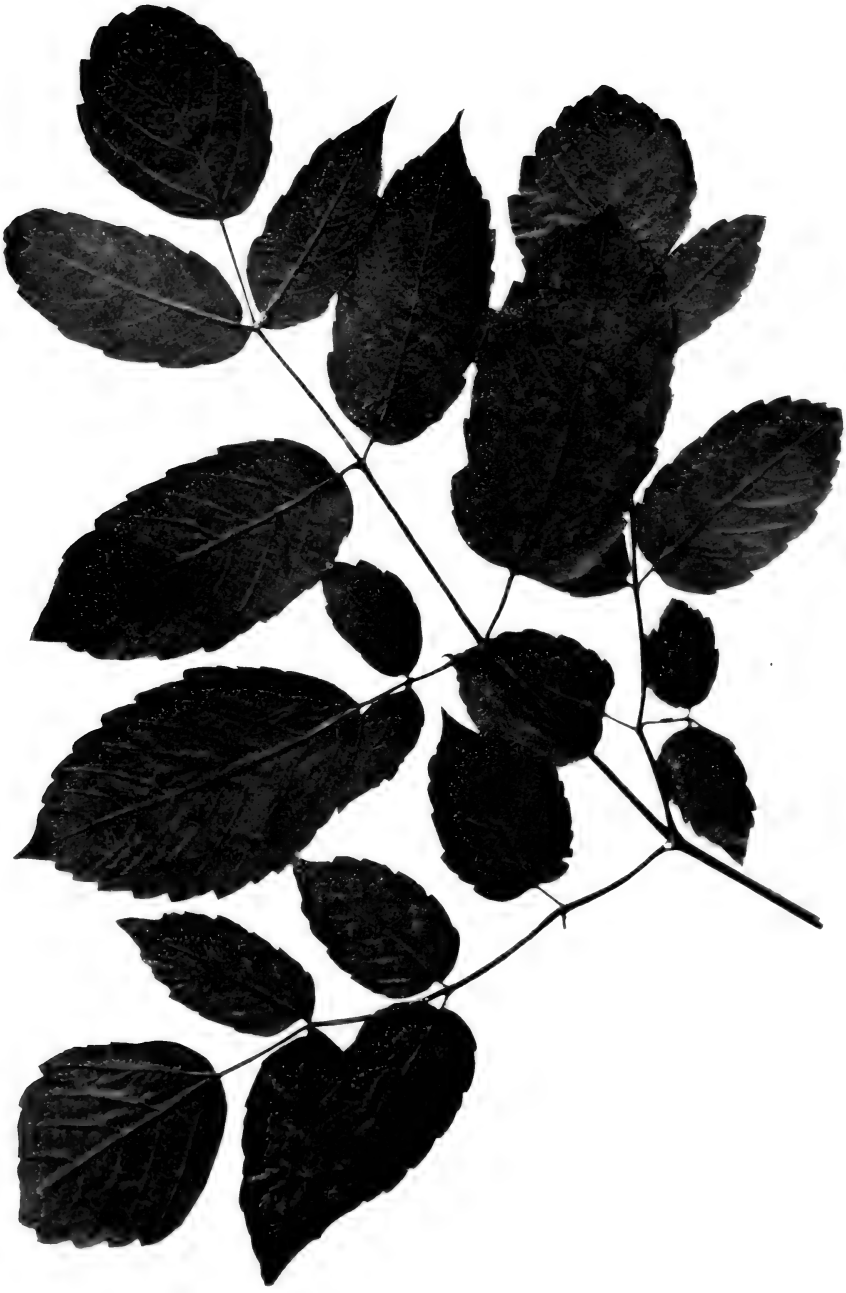


Fig. 16.—Vitis megaphylla (*Diels and Gilg*).
Leaflets $4\frac{1}{2}$ inches long by $2\frac{3}{4}$ inches broad

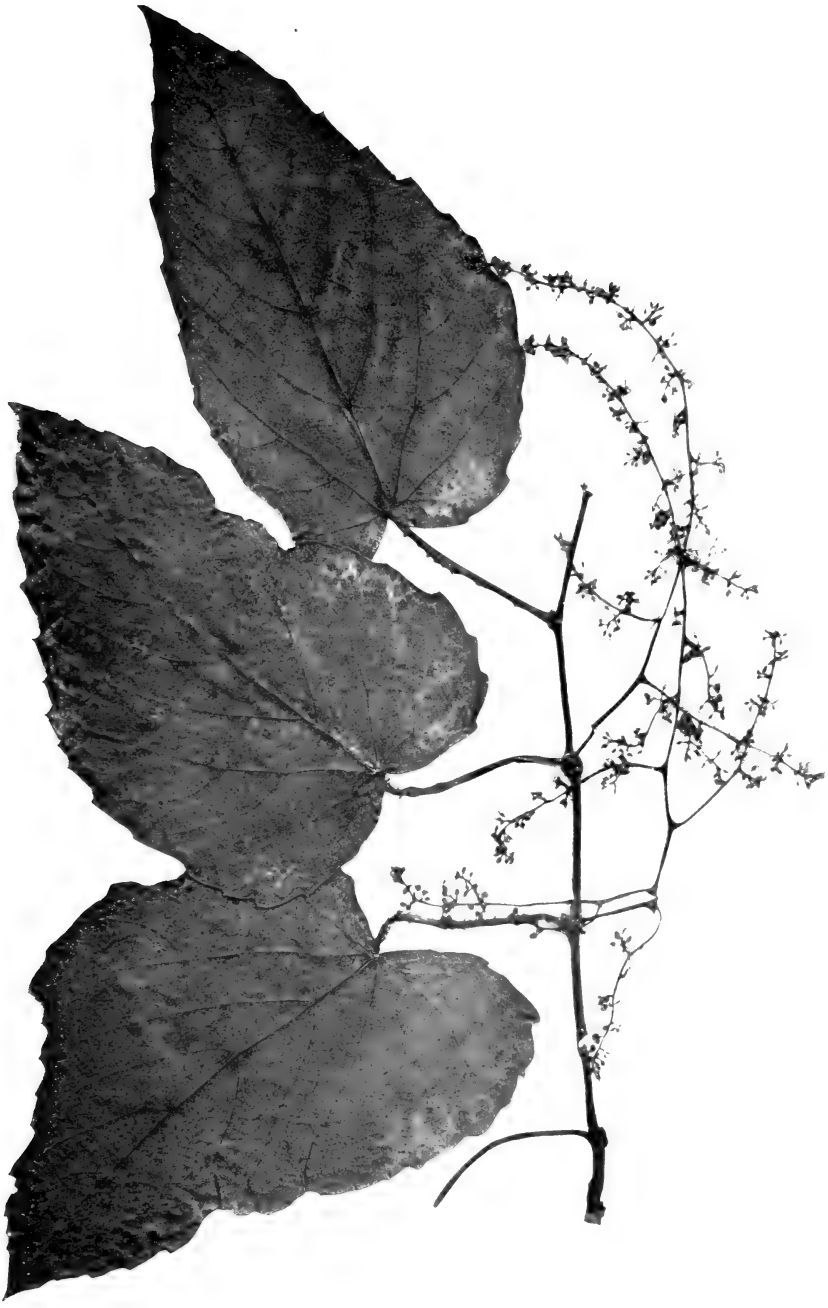


Fig. 17.—Vitis armata (*Diels and Gilg*).
(Leaves and flowers.)

Leaves 6 to 7 inches long by $4\frac{3}{4}$ inches wide at their broadest.

Fig. 18. Dipteronia sinensis (*Oliver*).
(Flowers and leaf.)

Flowers numerous, white, polygamous, disposed in terminal panicles, 1 foot in length.

more. Sir J. D. Hooker in describing the Chinese species, *Rubus lasiostylus*, in the "Botanical Magazine," tab. 7426, states: "Having regard to the extent of country in China that is botanically unexplored, especially in the mountain regions, there can be no doubt but that this country is the headquarters of the genus, greatly surpassing the Himalaya, whence only forty species have been described. Europe may boast of a far greater number of recorded species; but the vast preponderance of these are closely allied forms of one type as to the limits of which forms botanists have the most divergent opinions, whereas in China and India many types of the genus occur that have no allies in Europe."

The most striking novelties are *Rubus Henryi* with trilobed leaves, dark green and glabrous above and clothed with a dense woolly tomentum on the young wood and under surface, and *Rubus bambusarum*, similar to the preceding, but with leaves dissected into three lanceolate leaflets. The latter is an evergreen climber, its narrow leaves adapted to catch the scattered beams of light in the Bamboo woods. The leaves are dried and used as tea.

Rubus chroösepalus is a large growing species with leaves resembling those of *Tilia alba*. The inflorescence is a large loose panicle, but the flowers are destitute of petals, the inner surface of the sepals being coloured in compensation.

Rubus irenæus is also an interesting species, apparently quite hardy. The leaves are nearly circular, with a cordate base and a slightly 3–5 lobed margin. The upper surface is glabrous and the under covered with a white tomentum ferrugineous along the principal veins.

Cydonia (*Pyrus*) *cathayensis* and *Cydonia sinensis* are two useful additions to this favourite garden genus: the former has been in cultivation at Kew for a number of years, and has blush-white flowers; the latter has blooms of intense crimson.

The genus *Spiræa* is represented by many showy species, of which *Spiræa Henryi* is probably the best. (Fig. 20.) It is a shrubby plant belonging to the *Spiræa canescens* group, furnished with ovate leaves, $1\frac{1}{4}$–$1\frac{1}{2}$ in. long by $\frac{1}{2}$–$\frac{3}{4}$ in. broad, serrated along the apical margin of the leaf, slightly pilose on the upper surface, and densely so underneath. The flowers are produced in dense corymbs terminating dwarf shoots along the whole length of the branches. They are small individually, pure white, and very showy in the mass. Another species, somewhat resembling this, has been named *Spiræa Veitchii* by Mr. Hemsley, of the Kew Herbarium. It differs in having smaller leaves and flowers, the former being entire and obovate and the latter produced in smaller corymbs, and is said by Wilson to be Hupeh's best *Spiræa*. Certainly both species promise to be most valuable.

The species of *Neillia* at present in cultivation (usually known as Spiræas) are natives either of North America or the Himalayas.

Neillia sinensis, a new Chinese species first discovered by Dr. Henry, promises to be an important addition to our ornamental flowering shrubs. It forms a bush about four feet high furnished with elegant ovate-acuminate leaves with irregularly serrated margins, $2\frac{3}{4}$ in. long by $1\frac{1}{2}$ in. broad, petiolate and stipulate. The inflorescence consists of a many-flowered simple raceme, 3–4 in. long, composed of rosy-pink tubular

flowers, about ½ in. in length, and somewhat resembling those of *Ribes sanguineum*, but of a larger size and brighter colour.

The Chinese flora is extremely rich in genera belonging to *Saxifragaceæ*, containing species, comprising both herbs and shrubs, of great value as garden plants.

Amongst the herbs *Astilbe Davidii* is undoubtedly the best and will always be one of the most beautiful of hardy plants. It has been amply described and figured in the horticultural periodicals during the past year, so that further description here would be superfluous. It will shortly be distributed.

Closely allied to *Astilbe* is the genus *Rodgersia*, containing four species, all of which are handsome herbaceous plants. The best known in gardens is *Rodgersia podophylla*, a Japanese species introduced through our collector, the late Charles Maries, in 1882. *Rodgersia æsculifolia* (the Horse Chestnut-leaved *Rodgersia*) is a handsome Chinese species which is described in the *Gardeners' Chronicle*, August 23, 1902, by Dr. A. Henry as follows: "*Rodgersia æsculifolia* is referred to in Chinese herbal as the 'Devil's Lamp-stand,' and colloquially in Hupeh as the 'Old Serpent's Dish.' It is a large plant, attaining six feet in height, with leaves larger than in *Rodgersia podophylla*. The plant varies in pubescence; the leaves beneath on the veins are often covered with a short white pubescence, but they are often glabrous. The inflorescence is always pubescent. The leaves above are either single or trifoliate; below they are septemfoliate, the leaves being digitate. The flowers are produced in large panicles, whitish and fragrant."

Deinanthe bifida is also a herbaceous saxifragaceous plant, remarkable in having unisexual, hermaphrodite, and sterile flowers on one and the same inflorescence. The foliage consists of four leaves borne in a whorl: they are broadly ovate in outline with serrate margins, and in some cases are bifid at the apex. Dr. Henry describes the flowers as blue, and Wilson in his notes states, "Flowers lake." It grows in ravines on sides of the cliffs, in similar situations to *Hydrangea longipes* and simulating it at a distance.

Schizophragma integrifolia, remarkable in having its inflorescence surrounded by white bracts, in the same manner as the old and well-known stove plant, *Mussænda frondosa*, is a semi-scandent shrub, quite hardy in this country. The leaves are opposite, ovate-lanceolate, 8½ in. long by 4 in. broad, petiolate, and minutely serrate. The bracts which form such a conspicuous part of the inflorescence are 3 in. in length and 1½ in. in width, ovate in shape and pure white in colour. From twelve to thirty are produced in one inflorescence. (Fig. 21.)

Philadelphus and *Deutzia* are both represented by several species of great horticultural merit differing from those in British gardens.

Hitherto but one species of the genus *Itea* has been in general cultivation, the American *Itea virginica*, a deciduous shrub sometimes forced in early spring for the sake of its small racemes of greenish white flowers.

Itea ilicifolia is an important addition to the genus and also to our list of hardy Chinese shrubs. As its specific name implies, the leaves resemble those of a Holly, being evergreen, coriaceous in texture, with a

Fig. 19.—Dipteronia sinensis (*Oliver*).
(Fruit and leaves.)

Fruit of two connate carpels; each carpel is obliquely obovate, 1 inch long by $\frac{3}{4}$ inch broad, surrounded by a membranous wing.

Fig. 20. Spiræa Henryi (*Hemsley*).

Flowers small, white, densely borne along the whole length of the previous year's growth.

Fig. 21.—Schizophragma integrifolia (*Oliver*).
Inflorescence 1 foot in diameter, loose; leaves $6\frac{1}{2}$ inches long by $4\frac{1}{2}$ inches broad.

Fig. 22. Itea ilicifolia (*Oliver*).

Leaves 2¼ inches in length by 1⅝ inch broad; flowers in terminal racemes, 10 to 14 inches in length.

spinous toothed margin. The inflorescence is a remarkable one, consisting of a simple raceme, 9–12 in. in length, densely covered with small white flowers, solitary at the termination of the branches. Seedling plants have stood the past winter uninjured, and appear to be perfectly hardy in this country. (Fig. 22.)

Another genus of ligneous plants belonging to *Saxifragaceæ* which is worthy of note is *Ribes*, of which several species are in cultivation. The most remarkable is *Ribes longeracemosum*, so named on account of the great length of its raceme, often from 8–12 in. The leaves resemble those of our ordinary Red Currant, and the fruit is black and edible. Of little value as an ornamental shrub it may be of service in hybridising with our cultivated Currants.

The Viburnums of China are numerous and handsome. Strikingly conspicuous among them all is *Viburnum rhytidophyllum*, a shrub attaining the height of ten feet, the leaves of which are unlike any other member of the genus. They measure 8–8½ in. in length, and 2–2¼ in. in width, are broadly lanceolate in outline, with a prominent nervation on the upper surface, intensified beneath by the presence of a dense woolly tomentum. The branches are terminated by a large corymb, 7–8 in. across, of yellowish-white flowers, small individually but conspicuous in a mass. (Fig. 23.)

Two other species, *Viburnum Veitchii* and *Viburnum buddleifolium*, somewhat resemble the above named, but are smaller in all their parts. The former has ovate-lanceolate leaves 4 in. long by 1½ in. broad, and an inflorescence 5 in. in diameter; the latter has ovate-acuminate leaves with a dentate margin, 5 in. long by 3¼ in. broad, and densely tomentose on the under surface. Both are new to science and but recently named by Mr. C. H. Wright of Kew.

Many of the Chinese Loniceras, or Honeysuckles, are extremely interesting to the botanist, but of little use as ornamental plants, though an exception in this respect is *Lonicera tragophylla*, which is by far the best from a gardener's point of view. This is a twining shrub with opposite and decussate entire leaves, 4 in. long by 1¼ in. broad; the two pairs subtending the inflorescence become connate, forming an almost circular perfoliate bract, with two projecting points which indicate the apices of the connate leaves. The flowers are borne in an umbel terminating the branches, and consist of ten or twelve tubular flowers, 2½ in. in length, bright golden-yellow when first expanded, becoming reddish as they mature. In describing it in "Index Floræ Sinensis" Mr. Hemsley states: "Closely related to *Lonicera Caprifolium*, Linn., differing in the longer narrower leaves, fewer larger flowers, and other small details. So far as we know there is no allied species nearer than the Caucasus, the American species of this group being less like the present plant." It is perfectly hardy, is growing freely in Surrey, and is promising. (Fig. 24.)

Besides *Senecio clivorum*, which has already flowered, there are several other members of the *Compositæ* which promise well. These are *Senecio Ligularia* var. *speciosa* and *Inula racemosa*, the former producing an inflorescence, 1 ft. 6 in. in length, composed of bright yellow flowers subtended by a tuft of bold cordate leaves. *Inula racemosa* (also found in the Himalayas) has yellow flowers, 2½–3 in. in diameter, and

amplexicaule-ovate acute leaves with a whitish velvety tomentum on the under surface.

In the *Ericaceæ*, *Rhododendron* is represented by the largest number of species, and some are of striking beauty. Space will not permit me to mention more than two of them: *Rhododendron auriculatum*, the largest-flowered, and *Rhododendron micranthum*, the smallest-flowered species in the collection, are perhaps the most interesting.

Rhododendron auriculatum is a shrub, 10–30 ft. in height, with entire coriaceous leaves, obovate in outline, 8 in. long by $2\frac{3}{4}$ in. broad, prolonged at the base into auricles, or ears, from which peculiarities it takes its specific name. The flowers are large, funnel-shaped, 3 in. in depth, expanding 4–$4\frac{1}{2}$ in. at the mouth, pure white or rosy pink in colour, and of striking appearance. (Fig. 25.)

Rhododendron micranthum would not readily be recognised as a Rhododendron, but that it belongs to that genus is evident on close examination. It occurs on cliffs, north of the Yangtsze, at elevations above 5,000 feet, where it forms a bush from 4–20 ft. high. The leaves are small, obovate, acuminate at base, $1\frac{1}{2}$ in. long by $\frac{3}{8}$ in. broad, dark green on the upper surface, covered with ferrugineous scales beneath. The inflorescence is a simple erect raceme, 2 in. long, terminating the branches and composed of numerous small white flowers which are about $\frac{1}{4}$ in. in diameter and broadly funnel-shaped with exserted stamens situated on pedicels, $\frac{1}{4}$ in. long. The dried specimens show that in a wild state this species is very floriferous; and although the individual flowers are small, their pure-white colour and abundance should render them attractive.

Primula ovalifolia makes but a disappointing specimen when prepared for the herbarium, losing both colour and shape of flower; yet in the wild state it is one of the most beautiful of the genus. Its native habitat is in moist shady woods, high up on the mountains, where it flowers very freely as soon as the snow disappears, making quite a carpet of bloom, in this respect resembling our common Primrose. In colour the flowers approach nearer blue than do those of any other known member of the genus. They are large and borne in a dense umbel on a scape about 6 in. high, springing from a tuft of oval or obovate radical leaves.

Like many other Primulas, the seed of this species when first sent home failed to germinate, but some plants arrived in a weakly condition and have developed into healthy specimens from which it is hoped flowers will be produced.

The natural order *Oleaceæ* is represented in the Chinese flora by many useful garden plants, and the present collection includes several, comprising species belonging to the genera *Olea*, *Ligustrum*, *Jasminum*, *Fraxinus*, &c. Of these the most important is *Jasminum primulinum* (the Primrose-flowered Jasmine). It was first discovered by Mr. Hancock growing in hedges and copses in Yunnan, and from his specimen Mr. Hemsley described it in the "Kew Bulletin" for 1895. The habit and general appearance of the plant simulate *Jasminum nudiflorum*; the branches are four-angled and the leaves trifoliate.

The flowers are bright golden yellow, produced, usually in pairs, in the axils of the leaves, along the whole length of the previous year's growth.

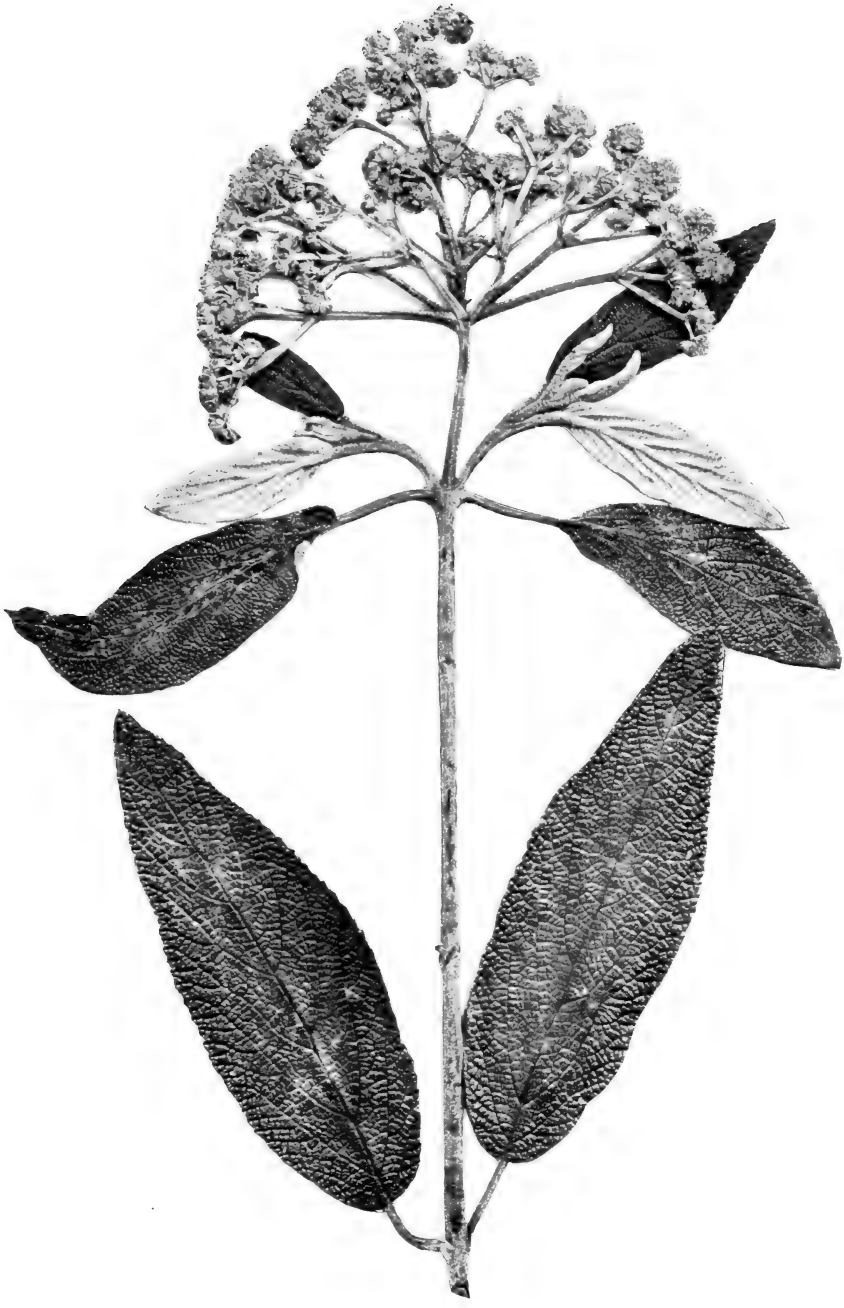


FIG. 23.—VIBURNUM RHYTIDOPHYLLUM (*Hemsley*).

Leaves 8 to 8½ inches long; flowers borne in terminal corymbs, 7 to 8 inches in diameter.

Fig. 24. Lonicera tragophylla (*Hemsley*).
Flowers 10 to 12, in an umbel, and $2\frac{1}{2}$ inches in length.

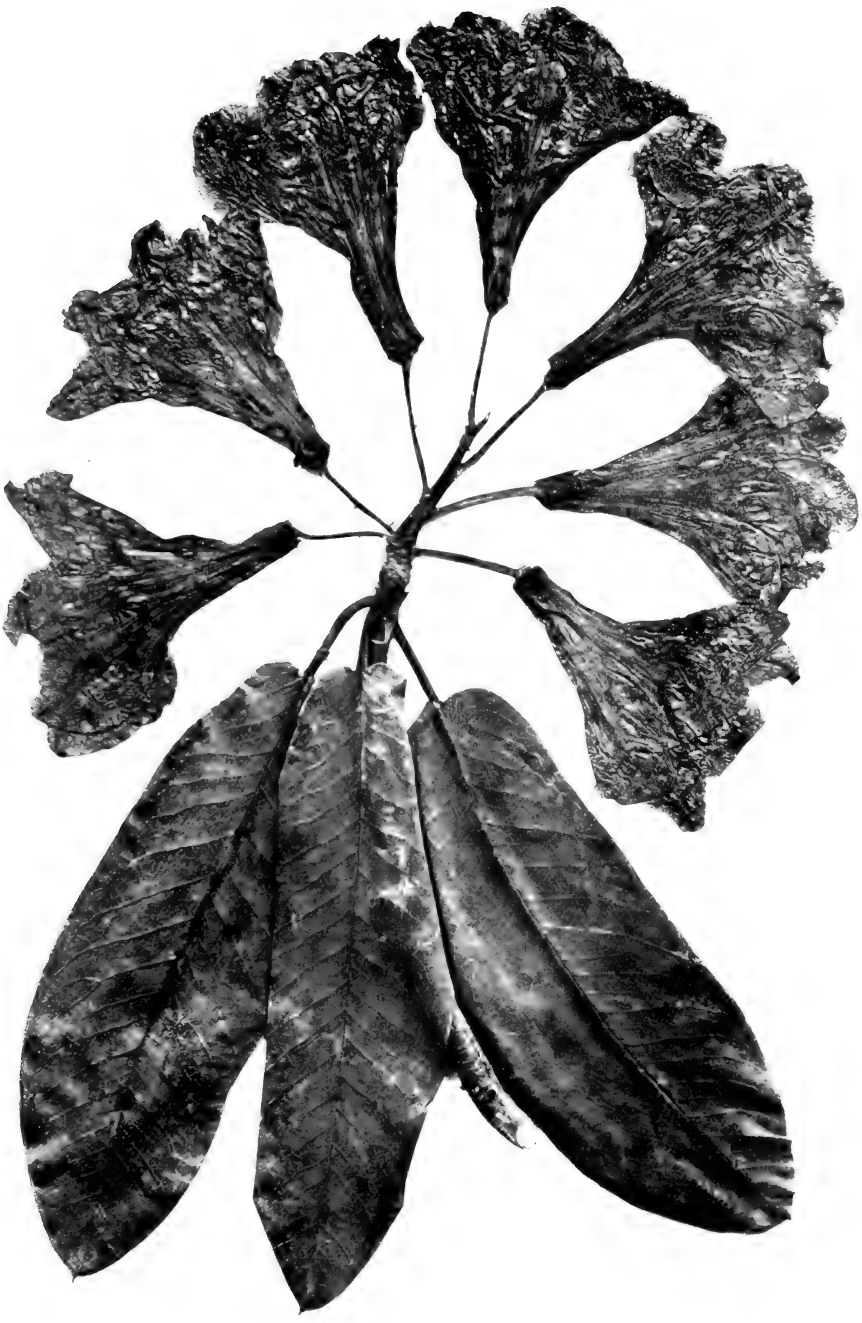


Fig. 25.—Rhododendron auriculatum (*Hemsley*).

Flowers white or blush, 3 inches in depth, expanding 4 to 4½ inches at the mouth.

FIG. 26.—PTEROCARYA PALIURUS (*Batalin*).

Leaves 4 inches long by $2\frac{1}{2}$ inches broad. The samaras are $2\frac{1}{2}$ inches in diameter, in a raceme a foot or more long.

The corolla is shaped like that of a Primrose, with a short tube and a spreading limb composed of six to seven rotate segments and measuring from $1\frac{1}{2}$–$1\frac{3}{4}$ in. in diameter.

It is figured in Hooker's "Icones Plantarum," tab. 2384, where Prof. Oliver writes: "Excepting in the larger leaves, sometimes fairly if not fully developed at the time of flowering, and much larger flowers, with the limb of the corolla exceeding the tube, this plant might be regarded as a glorified variety of *Jasminum nudiflorum*. It is evidently a very free flowerer and in the very first rank of ornamental shrubs."

Jasminum primulinum flowered at the Coombe Wood Nursery during the past spring, both in pots in a cool house and on a north wall out of doors, where it had stood for the past three winters. The latter situation appears to suit the requirements of the plant best, much finer and more numerous flowers being produced, and more foliage retained than when grown in pots. A remarkable peculiarity is the way in which the flowers become semi-double, and some, hose-in-hose, characters well depicted in the *Gardeners' Chronicle*, March 28, 1903.

Several forms of *Buddleia variabilis* are in gardens, but none so fine as the variety *Veitchiana* which flowered and was exhibited in August 1902. It is a magnificent shrub.

Buddleia albiflora is a new species first discovered by Dr. Henry, from whose specimens it was named by Mr. Hemsley. The specific name is unfortunate, as the flowers are not white but pale mauve with an orange throat. It is quite hardy, very handsome, and flowered last year, proving quite distinct from other species in cultivation.

Buddleia asiatica is a small growing species with narrow lanceolate leaves, 4 in. long by $\frac{1}{2}$ in. broad, dark green on the upper surface, white beneath; the inflorescence is both axillary and terminal, consisting of racemes 4–6 in. long, of small white fragrant flowers. It has already flowered in England as long ago as 1874, but so far as we know is not in general cultivation. A figure is given in the "Botanical Magazine," tab. 6323, where Sir Joseph Hooker writes: "It is certainly remarkable that so very common, elegant, and sweet-scented a plant as this, which flowers for three months continuously in India, should not be in common cultivation."

Pterocarya Paliurus takes its specific name from the resemblance its fruit bears to that of *Paliurus præcox*, a resemblance so close that when the disc-shaped samara of the two are mixed it is a difficult matter to separate them into their respective species. (Fig. 26.)

Those Pterocaryas at present in cultivation are liable to injury by frost, but from the vigorous condition of the seedlings and the cold climate which this species endures in its native habitat it is reasonable to anticipate its hardiness in this country. It forms a tree 20–50 ft. in height.

Populus lasiocarpa is a handsome addition to our Poplars, discovered by Dr. Henry in the province of Hupeh, where it is said to be common in mountains from 4,000–6,000 ft. elevation. It forms a tree 20–40 ft. high and possesses the largest leaves of any in the genus: these are 10 in. long by 7 in. broad, with a petiole 2–3 in. in length, broadly ovate-cordate in outline with a finely serrated margin, dark green on the upper surface,

with a velvety tomentum along the principal veins of the under. The capsules are numerous, ovoid in shape, and dehisce by 2–3 valves. (Fig. 27.)

Closely related to *Populus* is *Salix Francheti*, which, like the foregoing, is remarkable as being the largest-leaved species of the genus. Unfortunately the seed received has so far failed to germinate.

Of the Chinese Limes it is probably too early to say what their ultimate value will be in this country, but of their beauty there can be no doubt. Two stand out prominently as acquisitions, *Tilia Tuan* and *Tilia Henryana*.

Tilia Tuan, figured in Hooker's "Icones Plantarum," is a tree 40 ft. high with membranaceous obliquely ovate leaves, semi-cordate at the base, 3½ in. broad, and 4½–5 in. long, furnished with petioles 1½ in. in length. The upper surface is glabrous and dark green, the under covered with a stellate white tomentum. It is a very floriferous species, the flowers being borne in cymes, subtended by a bract which is adnate to about 3 in. of the pedicel, 5½ in. long by 1 in. broad.

Tilia Henryana somewhat resembles the above, but the leaves are broader, less oblique, markedly ciliate-dentate along the margins, and are furnished with ferrugineous hairs in the axils of the primary and secondary veins on the under surface. The cymes are more densely flowered, and the bract is not continued to the base of the peduncle.

Several new conifers have been introduced, and are receiving full trial. A series of articles on these by Dr. M. T. Masters, F.R.S., and some excellent figures have appeared in the *Gardeners' Chronicle* during the early part of this year, to which the reader is referred.

Numerous species of forest trees belonging to the genera *Castanea*, *Fagus*, *Betula*, *Alnus*, *Carpinus*, *Quercus*, &c. are also represented in the grounds at Coombe Wood, some of the latter being very handsome.

The following collection of dried plants from Central China was exhibited before the Royal Horticultural Society at the Drill Hall, April 7, 1903. Duplicate collections have been distributed to the leading botanic centres of Europe and America, the most complete being sent to the Kew Herbarium.

RANUNCULACEÆ.

Aconitum Hemsleyanum.
Astilbe Davidii.
Clematis Armandi.
Clematis montana var. *rubra.*
„ two undetermined species.

MAGNOLIACEÆ.

Eucommia ulmoides.
Euptelea Davidiana.
Liriodendron tulipifera var. *sinensis.*
Magnolia hypoleuca.
Tetracentron sinense.

BERBERIDACEÆ.

Berberis acuminata.
Berberis, one undetermined species

FUMARIACEÆ.

Corydalis cheilanthifolia.
„ *thalictrifolia.*
Corydalis tomentella.

Fig. 27.—Populus lasiocarpa (*Oliver*).
(Leaves and fruit.)

A large tree, 20 to 40 feet high. Leaves 10 inches in length by 7 inches in breadth. Fruit in racemes 7 to 8 inches in length.

Bixaceæ.

Carrieria calycina.
Idesia polycarpa.

Hypericineæ.

Hypericum chinense.

Ternstrœmiaceæ.

Actinidia chinensis.
„ six undetermined species.
Camellia Grijsii.
Eurya, one undetermined species.
Stachyurus præcox.
Stuartia monogyna.

Malvaceæ.

Abutilon sinense.

Tiliaceæ.

Tilia Henryana.
„ *Tuan.*
Tilia, four undetermined species.

Aquifoliaceæ.

Ilex macrocarpa.
„ *Pernyi.*
Ilex, nine undetermined species.

Celastraceæ.

Celastrus hypoglaucus.
„ *latifolius.*
Euonymus, two undetermined species.

Rhamnaceæ.

Hovenia dulcis.
Paliurus, one undetermined species.
Rhamnus, three undetermined species.

Ampelidaceæ.

Vitis armata.
„ *Delavayi.*
„ *flexuosa.*
„ *inconstans.*
„ *Labrusca.*
„ *megaphylla.*
Vitis obtecta.
„ *Romaneti.*
„ *serjanæfolia.*
„ *Thomsoni.*
„ *Thunbergii.*
„ four undetermined species.

Sapindaceæ.

Acer Davidi.
„ *Francheti.*
„ *griseum.*
„ *Henryi.*
„ *lævigatum.*
„ *laxiflorum.*
„ *oblongum.*
„ *sutchuenense.*
„ *tetramerum.*
„ fourteen undetermined species.
Æsculus chinensis.
Dipteronia sinensis.
Euscaphis staphyleoides.
Kœlreuteria bipinnata.
Staphylea Bumalda.
„ *holocarpa.*
„ one undetermined species.
Tapiscia sinensis.

Sabiaceæ.

Meliosma, three undetermined species.

Anacardiaceæ.

Rhus vernicifera.

Rhus, three undetermined species.

Leguminosæ.

Bauhinia, one undetermined species.
Cæsalpinia japonica.
Caragana Chamlagu.
Cercis chinensis.
Cercis racemosa.
Desmodium, one undetermined species.
Sophora flavescens.
„ one undetermined species.

Rosaceæ.

Amelanchier asiatica.
Cerasus sinensis.
Cotoneaster Francheti.
„ eight undetermined species.
Cratægus cuneata.
„ one undetermined species.
Cydonia cathayensis.
„ *sinensis.*
Kerria japonica.
Neillia sinensis.
Photinia, three undetermined species.
Potentilla chinensis.
„ one undetermined species.
Pyrus Toringo.
„ twenty undetermined species.
Rosa lævigata.
„ ten undetermined species.
Rubus bambusarum.
„ *chroösepalus.*
„ *coreanus.*
„ *Henryi.*
„ *irenæus.*
„ *Kuntzeanus.*
„ *lasiostylus.*
„ *parvifolius.*
„ *rosæfolius.*
„ ten undetermined species.
Spiræa Fortunei.
„ *Henryi.*
„ *prunifolia flore pleno.*
„ *Veitchii.*
„ five undetermined species.
Stransvaesia undulata.

Saxifragaceæ.

Astilbe Davidii.
„ one undetermined species.
Cardiandra alternifolia.
Decumaria sinensis.
Deinanthe bifida.
Deutzia, six undetermined species.
Hydrangea, ten undetermined species.
Itea ilicifolia.
Philadelphus tomentosus.
„ one undetermined species.
Ribes longeracemosum.
„ three undetermined species.
Rodgersia æsculifolia.
Schizophragma integrifolia.
„ one undetermined species.

Hamamelidaceæ.

Corylopsis pauciflora.

Corylopsis spicata.

Araliaceæ.

Acanthopanax diversifolium.
ricinifolium.

Aralia, one undetermined species.

Cornaceæ.

Aucuba, one undetermined species.
Cornus capitata.
Cornus, seven undetermined species.
Davidia involucrata.

Caprifoliaceæ.

Diervilla floribunda.
Dipelta floribunda.
Lonicera japonica.
„ *pileata.*
„ *tragophylla.*
„ three undetermined species.
Viburnum buddleifolium.
„ *plicatum.*
„ *rhytidophyllum.*
„ *utile.*
„ *Veitchii.*
„ ten undetermined species.

Compositæ.

Centaurea, one undetermined species.
Inula racemosa.
Senecio Ligularia var. *racemosus.*
„ *Henryi.*

Ericaceæ.

Clethra canescens.
Enkianthus himalaicus.
„ one undetermined species.
Pieris japonica.
„ *ovalifolia.*
„ one undetermined species.
Rhododendron aucubæfolium.
„ *Augustinii.*
Rhododendron auriculatum.
„ *decorum.*
„ *Fortunei.*
„ *hypoglaucum.*
„ *micranthum.*
„ *pittosporæfolium.*
„ five undetermined species.

Myrsinaceæ.

Ardisia Henryi.
Ardisia, one undetermined species.

Styraceæ.

Halesia hispida.
Styrax japonicum.
„ *serrulatum.*
„ *suberifolium.*
Styrax, two undetermined species.
Symplocos cratægoides.
„ *japonica.*
„ *prunifolia.*

Oleaceæ.

Fraxinus (*Ornus*) *bracteata.*
„ two undetermined species.
Jasminum primulinum.
„ two undetermined species.
Ligustrum, four undetermined species.
Olea, one undetermined species.
Syringa, two „ „

Loganiaceæ.

Buddleia albiflora.
„ *asiatica.*
Buddleia variabilis.
„ „ *Veitchiana.*

Boraginaceæ.

Ehretia macrophylla.

SCROPHULARIACEÆ.

Brandisia racemosa.
Rehmannia angulata.

BIGNONIACEÆ.

Catalpa Fargesi.

LABIATÆ.

Salvia miltiorhiza.

LAURACEÆ.

Litsea cupularis.
Litsea, two undetermined species.

THYMELÆACEÆ.

Daphne Genkwa.

EUPHORBIACEÆ.

Daphniphyllum macropodium.

JUGLANDACEÆ.

Juglans, three undetermined species.
Pterocarya stenoptera.
Pterocarya hupehensis.
„ *Paliurus.*

CUPULIFERÆ.

Betula alnoides var. *pyrifolia.*
„ *utilis.*
Betula, four undetermined species.
Carpinus cordata.
„ „ var. *chinensis.*
„ *laxiflora* var. *macrostachya.*
Carpinus, four undetermined species.
Corylus ferox var. *tibetica.*
Fagus, one undetermined species.
Ostrya japonica.
Quercus cleistocarpa.
„ five undetermined species.

SALICACEÆ.

Populus lasiocarpa.
Salix Francheti.

LILIACEÆ.

Asparagus, one undetermined species.
Lilium pulchellum.
Tricyrtis latifolia.

CONIFERÆ.

Abies firma.
Cephalotaxus Fortuni.
„ *Oliveri.*
Cupressus funebris.
Keteleeria Davidiana.
Libocedrus macrolepis.
Picea ajanensis.
Pinus (Cembra) Armandi.
„ *koraiensis.*

NATURAL SELECTION *VERSUS* ADAPTATION; OR, DARWINISM AND EVOLUTION.

By Rev. Prof. G. Henslow, M.A., V.M.H., &c.

Part I.—Natural Selection.

In 1839 Darwin first sketched out his ideas of Evolution, and in 1844 laid them before Sir (then Dr.) J. D. Hooker and Sir Charles Lyall. The paper consisted of two parts. The first part dealt with "The Variation of Organic Beings under Domestication and in their Natural State"; the second part formed the paper read before the Linnean Society on July 1, 1858, entitled "On the Variation of Organic Beings in a State of Nature; on the Natural Means of Selection; on the Comparison of Domestic Races and true Species."

On the same occasion a paper by Mr. A. R. Wallace was read, "On the Tendency of Varieties to depart indefinitely from the Original Type."

In both papers Evolution by the aid of Natural Selection is really the subject; but while Darwin based his theory on the study of animals and plants under domestication, Wallace maintained that "no influences as to varieties in a state of nature can be deduced from the observation of those occurring among domestic animals. The two are so much opposed to each other in every circumstance of their existence that what applies to one is almost sure not to apply to the other." *

Darwin was first led to entertain ideas of evolution by his studies of the extinct and existing fauna of South America and elsewhere in his voyage round the world in the "Beagle," and it is the great merit of his labours that they put before the world that great doctrine in a more presentable and acceptable form than had been previously done. He was far from being the first to believe in or describe it. One of the most important of his predecessors was Lamarck; but that observer introduced a hypothetical element, which rather damaged the acceptance of his theory, namely, the element of volition on the part of animals in acquiring new forms of structure; and attributing a power to the environment of being an actual cause of producing the change in the organism.

We shall see, however, that we are fast returning to "Lamarckism," with the omission of its untenable elements.

Darwin took his idea of "natural selection" from Malthus' "Essay on Population," published near the end of the eighteenth century. Wallace appears to have derived his from nature itself. But both utilised the "struggle for existence" which occurs everywhere in nature, partly in consequence of so many more offspring being born annually than can possibly survive; partly in consequence of overcrowding by other kinds of plants; partly by an inhospitable environment, enemies, ill luck, &c. But *the origin of specific characters depends upon alterations of form*, and not

* *Journ. Linn. Soc.* 1858, p. 61.

upon any one of those things which determine the survival of the most fortunate. "Natural Selection" is a "natural law"; that is, it is only an observed fact, always occurring under similar circumstances; but like "law" it can do nothing of itself, both being merely metaphorical expressions for "observed orders of facts." Darwin's first mistake was therefore the insertion of "structure" among the causes of limitation which Malthus enumerates.

Malthus showed that the population (*i.e.* of man) increased in a geometrical, but his food materials in arithmetical progression.

As far as the human race is concerned, it may be true, for man can establish himself in all parts of the world, since his intelligence enables him to overcome natural enemies; but his food supply, such as corn, can be made by artificial means to increase at a far higher geometrical rate than himself, as to thirtyfold or a hundredfold. Moreover, he can bring enormous areas, now naturally barren, under cultivation, as we are doing in Egypt, and shall do in South Africa, by means of irrigation, so that Malthus' theory in the eighteenth century requires some modification in the twentieth. But recognising this to some degree, Malthus seems to show that for any given area, say England, the amount of land capable of cultivation must sooner or later come to an end, but the population will still go on increasing. It seems by calculating in this way he would make the rates of increase so divergent, though both crops and cattle *per se* increase by geometrical progression.

The causes of limitation to which Malthus refers are locally famines, generally a feeble constitution and poverty in circumstances, where infant mortality is much greater than elsewhere, zymotic diseases, &c. With nature in the wild state things are somewhat different. With both animals and plants the offspring annually born is far in excess of the proportion that can live to maturity. A general result, however, is that an average remains constant, so that there must be a vast amount of destruction *in the young state*. The struggle for existence is often intense, and the question is, What is the cause of that destruction?

Many, of course, form the prey of others; indeed, the whole of the animal world lives directly or indirectly on plants. Many plants are crowded out by the stronger individuals, whether of the same kind or of other sorts when growing thickly together. Many seeds perish through ill luck, or, as Darwin calls it, "fortuitous destruction," * by falling on barren soil, on which they may germinate, but quickly perish.

Many seeds are much smaller than others from the same capsule in consequence of their not having been able to store up so much endosperm or reserve food materials for the embryo. The larger seeds on germination get a better start, and soon smother the others if growing in a mass together.

Anything, therefore, which can give an advantage to one individual above another has a better chance of surviving, so that of a hundred seedlings perhaps not half a dozen grow to maturity. The others perish in *infancy*. This is what Darwin calls "natural selection," a term which merely indicates what goes on in nature, just as a "natural law" only means what we see always taking place under the same circumstances.

I shall now quote the passage where Darwin defines natural selection.

* *Origin of Species*, p. 68.

Speaking of variations arising under cultivation and domesticity he says :* "Man can neither originate varieties nor prevent their occurrence ; he can only preserve and accumulate such as do occur. Unintentionally he exposes organic beings to new and changing conditions of life, and variability † ensues ; but similar changes of conditions might and do occur under nature. Let it also be borne in mind how infinitely complex and close-fitting are the mutual relations of all organic beings to each other and to their physical conditions of life ; and consequently *what infinitely varied diversities of structure* might be of use to each being under changing conditions of life. Can it then be thought improbable, seeing that variations useful to man have undoubtedly occurred, that other variations useful in some way to each being in the great and complex battle of life should occur in the course of many successive generations ? If such do occur, can we doubt (remembering that many more individuals are born than can possibly survive) that individuals having any advantage, however slight, over others would have the best chance of surviving and of procreating their kind ? On the other hand, we may feel sure that *any variation in the least degree injurious* would be rigidly destroyed. This preservation of favourable individual differences and variations and *the destruction of those which are injurious* I have called Natural Selection, or the 'Survival of the Fittest.'" ‡ I have italicised three sentences : the first to emphasise the introduction by Darwin of the word "structure," upon which *alone* varieties and species are based, into Malthus' theory ; an element which he never contemplated at all. Moreover, the destruction, when variations are supposed to arise to which Darwin refers, *takes place in infancy only*, that is, *before* any varietal or specific characters as a rule exist, because if the individual reaches maturity or the adult stage, as when flowers and fruits are borne by plants, such have been thereby "selected," so that any "beneficial or favourable characters" which Darwin supposed to be able to determine the survival are *non-existent when the destructive period occurs.*

The last two italicised sentences in the passage quoted are purely hypothetical, for "injurious" variations are not known to occur. Hence these sentences may be struck out, and what then remains ?

That *all* the variations are more or less in harmony with the new conditions of life. Hence natural selection as a *means* in securing the "origin of species" on *variations of structure* drops out of sight, and is relegated to its proper sphere of merely *registering*, so to say, what lives and what dies under any special conditions of life.

Notwithstanding his having introduced the word "structure," without which there can be no new variety or species, Darwin constantly refers to "constitution" as the, perhaps, most important element in deciding whether a young organism shall survive or perish under the early struggle for life ; but "constitution" does not indicate or have anything to do with *variations of structure* upon which "varieties" and "species" are based.

* *Origin of Species*, 6th ed., p. 62.

† Darwin constantly uses "variability," which means the "ability" to vary, for "variations."

‡ This term was suggested by Mr. Herbert Spencer.

This is really a most important admission. Darwin, for example, says: "Nature can act on every internal organ, on every shade of constitutional difference." Again: "Under nature the slightest differences of structure and constitution may well turn the nicely balanced scale in the struggle for life, and so be preserved." * It is a somewhat significant fact that having studied this subject from 1839 to 1868, the date of the publication of his "Animals and Plants under Domestication," Darwin could only write in the extremely hypothetical style, which is so patent in the passage quoted, wherein he describes natural selection; and that he was obliged to invent an illustration from architecture, instead of giving some actual cases among animals and plants, in which new variations were established by means of natural selection. Nature cannot have stopped the process; evolution must still be going on; yet no Darwinian has given any illustration in clear proof of the origin of a variety, by means of natural selection, during the last forty years since the "Origin of Species" appeared.

"If an architect were to rear a noble and commodious edifice without the use of cut stone by selecting from the fragments at the base of a precipice wedge-shaped stones for his arches, elongated stones for his lintels, and flat stones for his roof, we should admire his skill and regard him as the paramount power. Now the fragments of stone, though indispensable to the architect, bear to the edifice built by him the same relation † which the fluctuating variations of each organic being bear to the varied and admirable structures ultimately acquired by its modified descendants." ‡

It could scarcely be better shown how *totally void of any natural law* the process stands. Huxley called it a "method of trial and error." But no such method exists in other of Nature's laws. If gravitation, the laws of heat, &c. were inconstant, we could not depend upon them; yet in the highest and noblest work of Nature—the making of plants and animals, including man—the process is supposed to be due to chance variations "having *no* relationship to the requirements of the being."

Darwin, Wallace, Weismann, and others all attribute the inducement to vary to changed conditions of life, whether occurring in the district where the organisms are living, or whether through their migration—the most usual case—into other countries.

"As Professor Weismann has lately insisted, there are two factors, namely, the nature of the organism and the nature of the conditions.

"Indefinite variability is a much more common result of changed conditions than *definite* variability. . . . We see *indefinite* variability in the endless slight peculiarities which distinguish the individuals of the same species." § These he called "individual differences." ‖ These two words "definite" and "indefinite" demand our special attention, as well as "individual differences," to which he here refers.

It is often said by partially informed writers that natural selection is a *cause* of variations. This has arisen from the unfortunate style in which Darwin and Wallace have described it in *metaphorical* language.

* *Origin of Species* &c., p. 65.

† In reality, the point to be specially noticed is *the want of any relation* at all between them.

‡ *Animals and Plants under Domestication*, vol. ii. p. 430.

§ *Origin* &c., p. 6. ‖ *Ibid.* p. 34.

Darwin himself most distinctly repudiated all power in natural selection to give rise to variations of structure. His words are: "The direct action of the conditions of life, whether leading to definite or indefinite results, is a totally distinct consideration from the effects of natural selection; for natural selection depends on the survival under various and complex circumstances of the best fitted individuals, but has no relation whatever to the primary cause of any modification of structure." *

Similarly he wrote elsewhere, speaking of "the occurrence of profitable variations" under "changed conditions" :—"Unless such occur, natural selection can do nothing." †

This will be sufficient to clear the ground of any misapprehensions that may exist in the mind of any reader.

Alluding to his metaphorical use of the term "natural selection," Darwin says :—"It may metaphorically be said that natural selection is daily and hourly scrutinising, throughout the world, the slightest variations, rejecting those that are bad, preserving and adding up all that are good, silently and insensibly working, *whenever and wherever opportunity offers*, at the improvement of each organic being in relation to its organic and inorganic conditions of life." ‡

Darwin and Wallace, moreover, repeatedly use expressions about natural selection as if it were a real agent; and it is doubtless due to this that so many have been misled. Thus Darwin writes about insects in the following strain :—"Natural Selection may modify and adopt the larva of an insect to a score of contingencies wholly different from those which concern the mature insect. . . . In all cases natural selection will ensure that they shall not be injurious."

"Natural selection will modify the structure of the young in relation to the parent" &c. §

Similarly Wallace writes, in speaking of the evolution of man, how he would be "subject to the irresistible action of natural selection" . . . which "would most powerfully act" &c.

These few quotations will be sufficient for the reader to bear in mind that natural selection *does nothing*. If a being survives, it is because it has sufficient means of support and can live under the circumstances of its existence. If it dies, it does so because it has reached its normal end, or it has not enough food, or is killed by other beings or by some inorganic forces. The *difference* is designated by the words "natural selection"; that is all.

Now let us see what Darwin meant by "indefinite variations," for the entire theory which has been called "Darwinism" depends upon it. He says :—"The direct action of changed conditions leads to definite or indefinite results. In the latter case the organisation seems to become plastic, and we have much fluctuating variability." He has here in his mind what occurs in the garden, not in nature at all. "In the former case," he adds, "the nature of the organism is such that it yields readily when subjected to certain conditions, and all or nearly all the

* *Animals and Plants under Domestication*, vol. ii. p. 272.
† *Origin* &c., p. 64. ‡ *Origin* &c., p. 65. § *Origin* &c., p. 67.
‖ I would again remind the reader not to confound Darwin's theory of "the origin of species *by means of natural selection*" with *evolution* itself.

individuals become modified in the same way." * He repeats this elsewhere, adding: "A new sub-variety would thus be formed without the aid of natural selection." † This, we shall see in Part II. of this paper, forms the basis of the true method of evolution by self-adaptation or direct response of the organism to the environment. According to Darwin's theory there are three sources of "indefinite variations." The first is the more or less exaggerated individual differences which occur under cultivation; secondly, the insignificant individual differences which occur in wild plants; and thirdly, the changes which appear in the structure of the offspring of animals and plants which grow up under changed conditions of life.

In the third case they are purely imaginary, especially any "injurious" variations, which Darwin thought could arise and be rigidly destroyed by natural selection.

Darwin devotes a section to "individual differences," as he calls them, ‡ as a source of varieties and species, and writes as follows:—"The many slight differences which appear in the offspring from the same parents, or which it may be presumed have thus arisen, from being observed in the individuals of the same species inhabiting the same confined locality, may be called individual differences. . . . These are of the highest importance to us . . . they afford materials for natural selection to act on and accumulate, in the same manner as man accumulates in any given direction individual differences in his domesticated productions."

But there *is* a considerable difference between individual differences in nature and under cultivation. If any appear in cultivation worth preserving, as, *e.g.*, in the sizes and shapes of Carrots, or in the colours of the flowers of the Sweet Pea, such might be called "exaggerated" differences, as compared with what occur in nature. It is a rare thing for a wild species growing for generations in the same conditions of life to exhibit any differences of which a systematic botanist would take any notice as furnishing materials for classifying it as a sub-variety. Thus Violets may be white, or red, or purple, but such are not recognised as departures from the described type. Even if all the "Shirley Poppies," known to have arisen from one capsule, were wild, botanists would not regard them as different species, or even varieties.

It is a remarkable fact that with many of the commonest wild flowers, often growing socially in large masses, among which one would expect the chance of varieties occurring, none whatever are recognised at all; yet there are doubtless no two individuals of the same species absolutely alike. The reader will at once recall the Lesser Celandine, scarlet field Poppy the origin of the "Shirleys," Daisy, Common Heath and Ling, Foxglove, Bracken, &c. No varieties are recorded in Hooker's "Student's Flora" of any of these abundant species, with the exception of the first, in which slight differences in the petioles occur.

Some botanists have taken up the study of individual differences to endeavour to trace out any laws of variations arising from them.

It has been said, for example, that "if we may judge from some

* *Origin* &c., p. 106.
† *Origin* &c., p. 72, and *An. and Pl. under Dom.* ii. p. 271.
‡ *Origin* &c., p. 34.

recent utterances of botanists and zoologists it is evident that the mathematical and statistical study of variation is destined to occupy a prominent part in the development of biological research."* Dr. Davenport is reported to have said:—"The science of variation is therefore one of those that we hope to see established in this century. I feel convinced that statistical studies are first of all necessary to lay the foundations of the science."

I cannot help thinking that this belief is erroneous, being probably based on Darwin's mistake in supposing individual differences to be a source of the origin of species. The author referred to "treats of the numerical variation found in the ray-florets of *Helianthus annuus*."† He examined 1103 heads and found he could represent the numbers in maxima of frequency. The most prominent, about thirty times as high as others, was 21; but numbers oscillated about 13 and 34.

Those who are familiar with phyllotaxis will at once recognise these as representing the "angular divergences," $\frac{5}{13}$ $\frac{8}{21}$, and $\frac{13}{34}$; indeed they are just what might have been expected on *a priori* grounds. The author's object was to search for some bearing on evolution, whereas there is none at all, these high fractions being merely the result of crowding. The same fractions represent the arrangement of the scales of Fir cones &c.

Other writers have given statistics of the number of parts of flowers, as Mr. Cockerell did with the carpels of the Marsh Marigold,‡ but it leads to nothing; any number, more or less about an average, may be expected in examining hundreds of individuals as the result of varying amounts of nutrition. Such do not lead to varietal forms, much less to species. The explanation is that plants do not, or very rarely, grow with any mathematical exactness; so that mathematical statistics can hardly be expected to lead to practical origins of new forms. Consequently systematists invariably ignore these individual "differences" as not being strictly "varietal" in amount. If they be recognised at all, it is by expressing such variable numbers; thus, *e.g.* 4–6, which would apply to the number of the petals in individual flowers on one and the same corymb of Elder. It is only a mere question of nutrition.

Another example is worth giving. We know that the Wild Carrot, Parsnip, and Radish do not vary; but under cultivation they have given rise to several "races." Now, when the experiment was made of raising these plants in a prepared garden soil from seed taken from wild individuals, several "forms" appeared to each. Thus M. Carrière in experimenting with *Raphanus Raphanistrum* has figured some dozen different shapes of roots having also different colours. Similarly, Professor Buckman found the seed of the wild Parsnip gave him several types. These might be called "indefinite variations." In a sense they were: *i.e.* they were merely exaggerated "individual differences."

Now follows an important observation. Nature was only doing in a garden what she does elsewhere, only in a far less pronounced form: that is, variability is stimulated by the changed conditions of life. The

* "Numerical Variation of the Ray Florets of *Compositæ*," *Bot. Gaz.* vol. xxxiii. p. 462, June 1902, by E. Mead Wilcox, Alabama Polytechnic Institute, Auburn.

† Other illustrations will be found in *Biometrika*.

‡ *Nature*, March 21, 1895, p. 487.

seeds all respond and produce a host of seedlings. According to Darwin and Wallace, only one or two ought to be able to survive in a garden and all the rest *ought* to perish. Nothing of the kind occurs, for *all* would survive and prove themselves equally fit to live if they were not pulled up and thrown away. They *all* responded to the rich soil and *vary alike* in all essential features, viz. a fleshy enlarged root with larger and smoother foliage than that of the parent wild plant.

The differences we see in the shapes and colours of market forms of Carrots fall under the rank of "individual differences," and are non-varietal, though the Garden Carrot, taken as embracing all cultivated races, might be called a variety of the wild species; for if it had been discovered wild, and its origin unknown, it would undoubtedly have been recognised as a variety of *Daucus Carota*, var. *crassiradix*.

The point to remember is that as long as plants are growing wild, generation after generation, under constantly similar conditions their variability is not called into action beyond producing minute individual differences, of no account in classification.

If, however, plants and animals migrate, as by the seeds of the former being transported by birds &c., to some different type of locality, then more pronounced changes may be expected to take place in nature, as they do under cultivation.

Thus Darwin observes:—"Alphonse de Candolle and others have shown that plants which have very wide ranges generally present varieties; and this might have been expected, as they are exposed to diverse physical conditions." *

As an illustration of what might be called "exaggerated individual differences" in a wild plant the Lesser Celandine (*Ranunculus Ficaria*) may be taken. In England it varies slightly according to its locality, often producing corms in the axils of the long-stalked leaves when growing in shady places; but it has none in the open meadows. The size of the blade varies a little, and the number of petals &c.

In Malta, under a different climate, the whole plant grows to be a much finer plant, the leaf-blades and flowers being usually much larger than those of our English plants. Hence botanists have called it var. *Calthæfolia*, as it somewhat resembles the Marsh Marigold (*Caltha palustris*). Speaking generally, however, Darwin was undoubtedly wrong in crediting "individual differences" among wild flowers with being a *usual* source of varieties, much less of species.

Dr. Wallace appears to disagree with Darwin on this point, as he says: "In securing the development of new forms in adaptation to the new environment natural selection is supreme. Hence arises the real distinction, though we may not always be able to distinguish them, between specific and non-specific or developmental characters. The former are those definite though slight modifications through which each new species actually became adapted to its changed environment. They are therefore in their very nature useful. The latter [*i.e.* Darwin's individual differences] are due to the laws which determine the growth and development of the organism, and therefore rarely coincide exactly with the limits of a species." †

* *Origin* &c., p. 43. † *Natural Science*, vol. vi. p. 217.

I sum up now the erroneous features of "Darwinism." I would enumerate them as follows:

First, by adding "structure" to Malthus' theory he introduced an element which had nothing to do with it.

Secondly, by making "individual differences" a basis for natural selection, he adopted a source as a general rule quite incapable of the results expected. He was misled by assuming the numerous differences which occur under cultivation (as, *e.g.*, the hundreds of Sweet Peas &c.) to be imitated in nature, where, however, they do not occur.

Thirdly, he assumed that when plants and animals were placed under changed conditions of life the offspring grew up varying "indefinitely," so that only such as "happened" to be suitable survived. Hence there was *no natural law* connecting the favourable variations with the future requirements of the organism.*

Part II.—Adaptation, or the True Darwinism.

In dealing with this alternative to natural selection, I go to Darwin again; for he laid the foundation himself of the true method of Evolution, but without knowing it, in what he called "Definite Variation." The following passage will explain what he meant:—"If we ask ourselves why this or that character has been modified under domestication, we are, in most cases, lost in utter darkness. Many naturalists, especially of the French school, attribute every modification to the 'monde ambiant,' that is, to a changed climate, with all its diversity of heat and cold, dampness and dryness, light and electricity, to the nature of the soil and to varied kinds and amount of food. By the term definite action I mean an action of such a nature that when many individuals of the same variety are exposed during several generations to any change in their physical conditions of life all, or nearly all, the individuals are modified in the same manner. A new sub-variety would thus be produced without the aid of natural selection." †

Darwin, however, thought this to be very exceptional; for he says: "I will give in detail all the facts which I have been able to collect, rendering it probable that climate, food, &c. have acted so definitely and powerfully on the organisation of our domesticated productions that they have sufficed to form new sub-varieties or races without the aid of selection by man or of natural selection." The reader must be referred to the detailed account in the work itself; ‡ but it may be mentioned here that he gives seven kinds of flowers, three of variegated leaves, about fifteen of vegetable products, four of fruits, three of woods, and five of diseases (which, of course, have nothing to do with evolution or the origin of species). The above was published in 1868. However, in 1876

* It is an interesting fact that Darwin never foresaw the effect of this theory upon certain of his followers. He said:—"The birth both of the species and of the individual are [*sic*] equally parts of that grand sequence of events which our minds refuse to accept as the result of blind chance" (*Descent of Man*, ii. p. 395).

Haeckel says:—"Darwin gave us the key to the monistic explanation. Mechanism alone can give us a true explanation of natural phenomena. For it traces them to their efficient causes, viz. to blind and unconscious agencies" (*The Riddle of the Universe*, pp. 264, 265).

† *An. and Pl. under Dom.* ii. p. 271. ‡ *An. and Pl. under Dom.* ii. p. 281.

Darwin wrote as follows to Prof. Moritz Wagner, of Munich:—"The greatest mistake I made was, I now think, that I did not attach sufficient weight to the direct influence of food, climate, &c. quite independently of natural selection. When I wrote my book [1859]—and for some years later—I could not find a good proof of the direct action of the environment on the species. Such proofs are now plentiful." * Of course they were as plentiful in 1859 as in 1876. In fact they are universal. I cannot, therefore, but think that had Darwin lived till to-day he would have learnt that definite variations form the universal law in nature, and that natural selection is only concerned with the *distribution* of organisms and not with their *origin*. As I have published two books † on this subject I need only refer the reader to them for a full account of the argument based on both inductive and experimental proofs.

I would, however, like to add here a special case, as some experiments have completely corroborated the inductive evidence recorded in the second volume mentioned (p. 162).

It is a general fact that submerged leaves of dicotyledons are finely dissected; in a few cases they are ribbon-like, but it is exceptional. The former type is found in a great number of plants of quite distinct families; hence there is no affinity between them to account for it, and we are compelled to see some connection, or "cause and effect," between submergence and the dissected foliage.

A plant named *Proserpinaca palustris* of the United States belongs to the order *Haloragea*, to which the Water Milfoil (*Myriophyllum*) and the Mare's-tail belong, the former of which has dissected leaves and lives submerged. Now, the *Proserpinaca* is amphibious, so that when the leaves grow in air they are completely formed, being of a narrow, lanceolate shape with a serrated margin; but when it is submerged, the plant has leaves consisting of the midrib and lateral veins only, so that it is of a pectinate form.

In order to ascertain the actual cause of the change, Mr. W. Burnet McCallum experimented with light, nutrition, temperature, salts, relation to CO_2 and O_2, moist air, and a constant stimulus.

The conclusion was that he excluded everything but *water* as a cause, as was previously inferred by inductive evidence; but he went further by adding substances to the water which withdrew the excess of water from the protoplasm in the cells; the *Proserpinaca* then at once developed the air-form type of leaf under water. The following is Mr. McCallum's description of the process:

"The essential feature common to the water and moist air is the inhibition of transpiration and the consequent choking of the cells and the diluting of the protoplasm with water. This can be tested by growing the plants entirely under water and at the same time drawing the water out from the protoplasm, or in reality causing evaporation or transpiration by means of high osmotic pressure. Plants producing water leaves were placed in nutrient solutions of a strength not quite sufficient to plasmolyse

* Quoted by Büchner in *Last Words on Materialism*, p. 194. It is also included in his "Life" &c.

† *The Origin of Floral Structures* and *The Origin of Plant Structures* (International Scientific Series, K. Paul, Trench & Co.). The first is abridged in *The Making of Flowers* (S.P.C.K.).

them, also in very dilute solutions made up to the same osmotic pressure with KCl and also $Ca(NO_3)_2$. These were allowed to evaporate down, becoming gradually stronger. When they reached a strength of solution equal to about $\frac{1}{2}$ N salt solution *the water leaves ceased to form* and *the air type of leaf appeared.*" *

I shall now give a good instance of inductive evidence in support of self-adaptation in marine animals. One of the commonest means of propulsion is the "paddle" as employed in canoes and in the form of the oar in boats. Looking through the animal kingdom from the earliest times till now we find it has been very generally adopted by nature in several classes, as in crustacea, fishes, extinct marine reptiles, modern cetacea, in the tail of the beaver, and even in birds, as the aborted wings of penguins and auks. As these classes have nothing of the nature of affinity between them, the conclusion drawn from so many coincidences is that the "paddle," though made in various ways, is the definite result of the effort of the animal made in swimming, together with the mechanical or direct action of the water. Similarly the bilobed tail of a fish is imitated in extinct fossil marine reptiles and in modern whales and porpoises.

Numerous and similar series of coincidences can be drawn up from the animal kingdom, proving inductively that there has been a direct cause and effect between the animal and its habits with its environment.

Such are exactly parallel with the inference drawn from submerged leaves as described: It is not possible to corroborate inductive evidence in the animals mentioned by means of experiment, as in the case of *Proserpinaca palustris*, but the evidence is equally conclusive.

Nature herself, however, often performs similar experiments, as when crowded a shoot of the Water Crowfoot is forced to grow up into the air, or when a pond dries up and it has to grow in the mud only. Then, though the form of the dissected leaf is still retained by heredity, the segments are now rigid; they also abound with stomata, and all the anatomical details are now suited for an aërial existence.

As illustrations of plants acquiring the same forms under the opposite conditions of great drought, I need only mention the *Cactaceæ* of Mexico imitating Euphorbias and Stapelias of South Africa in their massive fluted and spiny stems devoid of leaves. Similarly *Agave* of America resembles *Aloë* of Africa.

Although Darwin founded his theory of natural selection on observations made on animals and plants under domestication, and was thereby misled as to "indefinite variation," nevertheless cultivation gives us the best illustrations of the way plants change in response to the definite action of the environment. Thus it is a familiar fact with cultivators that when native or wild plants are first introduced into gardens they often change so much that they even may assume all the appearance of a distinct species. For example, *Arabis anchoretica*, a plant with thin papery leaves, frequenting rocks in Switzerland, when grown at Kew resembles *A. alpina*, and it is the experience of a celebrated bulb-grower that many which came from the East could scarcely be recognised after a few

* "On the Nature of the Stimulus causing the Change of Form and Structure in *Proserpinaca palustris*," *Bot. Gaz.* vol. xxxiv. p. 93.

years' cultivation. *Brassica nigra* of Europe becomes *B. bracteolata* in Egypt &c.

The fact is that the composite nature of an artificially prepared soil acts as a powerful stimulus to variability, so that the living protoplasm responds at once, and the result is a new form in harmony with the environment.

A good illustration is seen in our kitchen garden root crops, as the Carrot, Parsnip, Radish, Turnip, and Beet.

With the exception of the last, all the others are annuals. In order to convert them into biennials the vegetative system is so stimulated that the reproductive process is delayed, and by sowing the seed of the wild plant late in the season it cannot flower the same year. Hence it has, so to say, a season and a half for the foliage to make a superabundance of food materials which have to be stored up in the root, which is now greatly enlarged to receive it.

The same effect is produced on the Beet and Mangold Wurzel when raised from the seed of the wild plant; though it is naturally a perennial, which thus becomes changed into a biennial.

Now this biennial "habit" has become fixed and hereditary as well as the "forms" of the roots.

The way to express this is precisely the same as when a variety or species is formed in nature, viz. the plant by means of its protoplasm responds to the direct action of the environment, and is developed accordingly into a fleshy root, and so forms the kitchen garden vegetable.

Similarly is it, *cæteris paribus*, with Cabbages, Onions, and all other kinds of vegetables, in which various parts of the plants have altered and become fixed features in each kind respectively.

We thus learn, first, by *inductive evidence*, from the study of the distribution and structure of organisms in nature that they arise by a process of self-adaptation or response to the direct action of the changed conditions of life; that if many seedlings appear of any one kind they all grow up alike, or, as Darwin expresses it, they "vary definitely."

As more are born than can live, natural selection stands for the survival of the *strongest* and the destruction of the *weakest*, but has no opportunity of "selecting" with the view of originating a new variety, since they all vary alike.

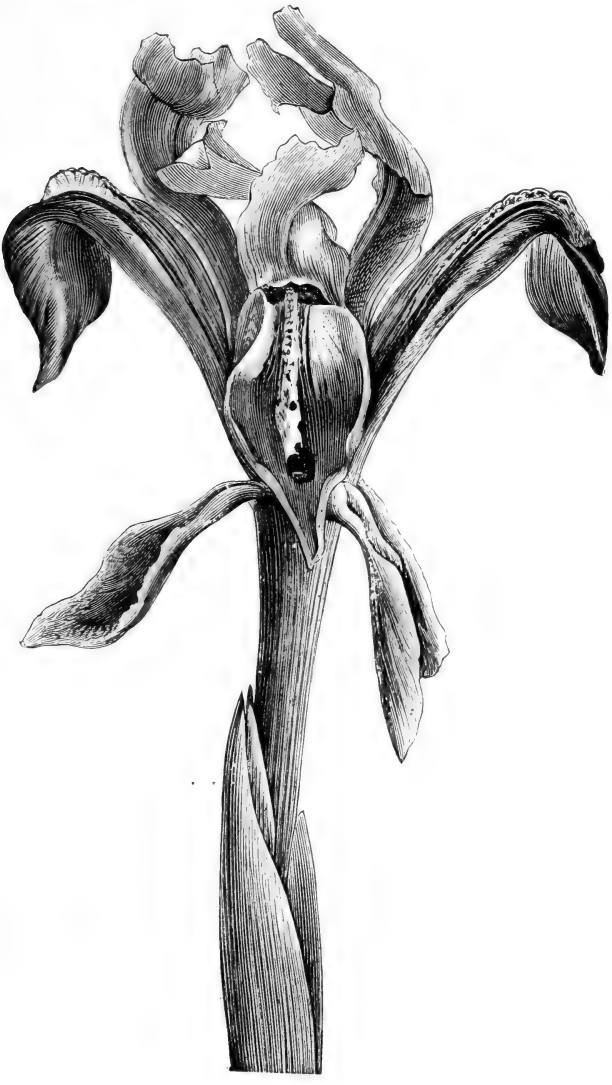
Inductive evidence having been first established, it can often be followed by experimental verification under cultivation and domestication.

The ultimate origin of adaptation resides in the living protoplasm and its nucleus. These are endowed with a "responsive power," so that when stimulated the cells give rise to different tissues, and the tissues form differently shaped organs. These latter suggest to systematists different terms in describing the organism as a sub-variety, variety, species, or genus.

Given, then, the first atom of living protoplasm with its nucleus, the whole of the vegetable and animal kingdom, including man, have issued from it. Protoplasm is practically omnipotent, not only in making new creatures, but in adapting any organ to a variety of purposes, as well as any organs for one and the same, if it be so desirable.

Hence evolution by protoplasmic adaptation to the environment has replaced the origin of species by means of natural selection.*

* As "Evolution by Adaptation," or, as I would call it, "The True Darwinism," has been credited to me, I beg to transfer the conception to its right owner—Darwin himself. It is his alternative to the theory of Natural Selection. All I have done was to collect recorded cases of adaptation, observe, and make experiments; and then, after some fifteen years, to publish the results in the books mentioned.



ANTS, GREEN FLY, AND SCALE.

By Doctor Bonavia, F.R.H.S.

"Indian Planting and Gardening" of February 14, 1903, gives some curious information about ants and aphides, quoted from a paper by Mr. M. Chittenden, Assistant Entomologist of the United States Department of Agriculture.

It had been known that ants suck up the sweet fluid exuded by two minute tubes at the end of the body of the aphis, and that ants had some means of inducing the aphis to give forth this sweet fluid more abundantly. But Mr. Chittenden appears to have gained some further knowledge regarding the curious relationship between the ant and the aphis. He states that in return for the services that the aphis renders to the ant the latter repays it handsomely. It not only guards and protects the helpless aphis when on the plant, but it gathers the eggs of the aphis and takes care of them in its own subterranean nests, to be distributed in due season on the tender parts of appropriate plants, whereby not only the newly hatched aphis is benefited, but the ant obtains, as it were, a sort of milch-cow to provide itself with food and drink!

If all this is true, it is a very fascinating and pretty discovery, and I have been much interested in reading it, because two years ago I conceived a suspicion that ants had something to do with the dissemination of aphides on plants. My suspicion was aroused in this way. I had just had a warm house erected and put therein some plants. A few days after I detected a minute larval green fly on one of the tender shoots. A small black ant was not far off, moving leisurely, as if it were unemployed. I wondered how this baby green fly had got there so soon after the house was erected and the plants put into it. The vicinity of the ant led me to suspect that the latter had something to do with the young aphis being there. I have often watched ants moving about the stem and leaves of plants to see if I could catch them red-handed at this sort of work; but as yet I have not succeeded in doing so. I fancy ants do a great deal of their work at night. They are accustomed to work in the dark in their underground tunnels.

Here, then, there appears to be a remarkable symbiosis between the ant and the aphis which was not suspected before. The discoverer of this interesting phenomenon says: "In frequent cases the ants compensate the plant-lice for the food which they derive, not alone by guarding the lice and protecting them from natural enemies, but by caring for their progeny as well as for their own, even gathering the eggs of the lice and taking them into their own subterranean nests, keeping them there over winter, and when warm weather sets in in spring returning them to the field and placing them on their appropriate food plants. In fact the relationship of these creatures is such that it is difficult to determine which is the benefactor and which the beneficiary.

In some cases, as, for example, with root-lice, winged individuals are sometimes not produced for a year or more, and when it is necessary in the course of nature for the plant-lice to migrate from one plant to another the ants carry them bodily to new pastures, and even prepare in advance places for their occupation. In this they seem to display a most remarkable intelligence, and recognise the necessity for a change when the plants affected by the lice become exhausted of their juices from the numbers of their insect parasites." Perhaps the time selected for transferring the aphides to new pastures is when the ants perceive that their tiny "milch-cows" are becoming dry.

Truly in that speck of a brain of the ant there seems to be stored up, through inheritance and experience, an amount of knowledge which is perfectly astonishing.

I regret that personally I have no time to carry out careful experiments in connection with this discovery, but it ought not to be difficult for an ant-entomologist to have some plants, usually affected by aphides, under glass cases for convenience of observation and experiment. Then by scattering about some aphides and by introducing some ants to see what they will do, this curious phenomenon of an association between the ant and the aphis, for mutual benefit, may be further studied. There may result, if this discovery be confirmed, some method of preventing the ants having access to a plant, such as rubbing some compound round the base of the stem over which ants would dislike to travel. They might thus be prevented from carrying their nurslings to the tender shoots of the plant.

It is not improbable that these ingenious ants may have formed somewhat similar associations with other insects than aphides. I have some Orange and Lemon plants trained on wires under the glass of a warm house. The under surfaces of their leaves are often infested with some species of scale-insect. Whenever this is the case I have observed that ants are very busy on these Citrus plants. It is not unlikely that some sort of symbiosis may also exist between these ants and this species of scale. I have picked off the scale from the leaves of these Citrus trees, and I am trying an experiment to see if I cannot deter the ants from climbing up them. It is well known that if some ants are crushed by the finger on the line of an ant procession on a wall or other surface, the other ants run away from the scent of their crushed companions; and the experiment I am trying is to crush some ants between the finger and thumb and rub them round the base of the stem: the rubbing will have to be done on the training wires also, as these ingenious creatures, if they cannot get up one way, may be trusted to find some other way, if possible, to get to the leaves of my Orange and Lemon plants. Now that some advance has been made in the psychology of these clever insects, it may be worth the while of some entomologist with leisure to make further experiments and researches into the life of the ant, with the view of discovering any other form of commensalism that they are capable of originating. In this connection a correspondent in the island of Madeira states that fruit trees there are infected with scale, and, curiously enough, he states that probably ants have a great deal to do with the dissemination of the pest.

THE BLUE NYMPHÆAS.

By James Hudson, V.M.H.

Introductory.—The Blue Nymphæas are not in any sense new introductions to our gardens. I note that *N. scutifolia* was introduced in 1792 from the Cape of good Hope, and *N. stellata* from Tropical Africa in 1812, whilst *N. gigantea* is recorded as having been sent home from Australia in 1852.* Within the past few years more attention has been devoted to their cultivation. This may, in some measure no doubt, be attributed to the greater amount of attention bestowed upon the genus generally since the advent of the remarkable hybrids raised by M. Latour-Marliac and others; these are, however, of quite a different character and constitution from the blue species and varieties. I do not think in any case that success has resulted so far in obtaining a Blue *Nymphæa* which may in any true sense be termed hardy in this country. They may, it is quite true, be grown out of doors during the summer months in favourable localities and under advantageous conditions, but this fact does not give to them any claim to be considered hardy. They are beyond any doubt, however, of much easier cultivation than was at one time deemed to be the case. It has been the association with huge tropical tanks and extremely high temperatures during the growing season that has militated against their becoming more popular. Such, for instance, as the conditions under which the *Victoria regia* is grown have been thought to be essential. Such conditions, however, are not at all necessary, nor is it requisite to have houses in which to grow them. By dispensing with costly erections the question of cultivation at once becomes more within the reach of the many than would otherwise be the case.

Cultivation. The Tanks.—Under this head I propose to simply record my own experience, which has now extended over about six seasons. We started by building a small tank to accommodate them (size 6 ft. by 8 ft., or thereabouts). In this tank provision was made for warming the water up to 75° or 80° by means of hot-water pipes connected to the service of a house adjoining. This arrangement has worked well and given no trouble. The tank was covered over by a movable three-quarter span frame, so as to afford protection from the time of planting the Lilies out until well established, when it was taken away, and the tank then became an open-air structure with the water warmed as already noted. For two seasons we grew what is known as the 'Berlin' variety of *N. stellata* under these conditions and flowered it most successfully. Being desirous of extending its culture and of adding other varieties two more tanks were built. These were each 6 ft. wide and 32 ft. long, being covered with span roof frames having lifting lights on either side. As in the first erection, piping was provided for warming the water, the pipes being placed around the sides and resting upon the set-off of the wall forming the tank 9 in. below the surface of the water. These tanks are all

* Vide *Dict. Gardening* (Nicholson).

18 in. deep, the brickwork being 9 in. in thickness below the ground level, whilst the upper part of it is 4½ in. thick. To this is added, of course, the usual rendering in cement to ensure the tanks being water-tight. Means in each case are provided for draining the tanks dry for cleansing purposes. If I were again building tanks for these Lilies I should only make one alteration, viz. I should provide for a depth, at least, of 2 ft. of water, but preferably 2 ft. 6 in. I recommend this because of the very vigorous growth of these Blue Nymphæas and in order to better cover the crown of the plant to a greater depth. We do not now take off the lights of the larger tanks because we find that the Lilies become too much exposed to the force of high winds, so much so in fact as to force the leaves out of the water on to the pathway adjoining, otherwise we should continue to do so. The smaller tank is now more frequently used for experimental purposes, or for what are considered delicate or tender varieties. I surmise by the length of the petiole, or leaf-stalk, of most of these Blue varieties that in their native habitats the depth of water is much greater; but I do not consider it is necessary beyond what I have indicated. The greater the body of water, the greater the pressure and the tendency to leakage in the tank.

The Soil &c.—Since we have grown these Lilies we have experimented with various composts, but I have come to the conclusion that nothing is so good and so safe for their well being as turfy loam, leaves of the previous season, and road grit. We have tried manure, first that from the cow-yard and then from the stables; but neither is, in my opinion, satisfactory or really essential. For the future I shall adhere to my first season's choice, which was as above quoted and recommended. I like the soil to be prepared and put into the tanks in a similar condition to that in which we use our soils for fruit borders &c., *i.e.* in a good working condition. By this means it can be made sufficiently firm without being rendered adhesive. Upon the bottom of the tanks we place rough rubble —broken brick-bats or clinkers to act as drainage. I would not in any case place the soil directly upon the bottom, any more than I would pot plants without any drainage, and for the same reason. This drainage is about four inches in thickness, and upon it is placed a layer of rough turf, then a layer of leaves (preferably those of the Oak or the Beech). Upon this come the finer leaves and road grit into which the plants are turned out from pots, and the water is immediately admitted, slowly at first, in order not to chill the plants. Why we keep the leaves covered is to prevent their floating, which for a time they would do, and that to the detriment of the plants. (Of course under natural conditions the leaves that settle upon the surface of the water and eventually afford a food for plant life therein sink during the dormant season of the plants.) When the Lilies are planted some clean gravel stones are placed around each one in order to keep it firm and to prevent any tendency to float to such an extent as to lift the tubers from their position. For a time after planting there is nearly always a light scum that rises from the soil to the surface: this vegetable growth, or "confervæ," should be skimmed off every few days. Presumably this is occasioned by the warming of the water whereby its growth is fostered. It is possible, I think, that this may arise from the kind of water in use and not directly from the soil.

Preparing the Plants.—Unlike the hardy Nymphæas which remain from year to year in the water, and in the same soil too, even if in tubs or in fountains, with a possible addition of soil thereto in the spring, these and other tropical Nymphæas succeed much better if replanted every spring. About the end of January we make it a rule to lift all of our stock and then take that opportunity for a thorough cleansing of the tanks. The tubers are put into pots for restarting into growth and are then kept in a warm house, where the water will maintain a temperature of about 70°. With one exception this is done at once. That exception is the 'Berlin' variety of *N. stellata*, which I find can be treated to a resting period. This Water Lily always loses its roots completely every winter—at least that is my experience of it at Gunnersbury. We keep the tubers of this variety in either sand or cocoa-fibre for three or four weeks. Then when potted and again placed in water fresh growth commences at once and increases with wonderful rapidity. It is not often that an old tuber will restart kindly, *i.e.* such a one as flowered profusely the previous year. The offsets, however, make strong plants; all that one could wish in fact. It is upon these that we rely for our renewal of stock. A strong plant will usually make two such offsets during the growing season. I think on the whole these remarks apply not only to the 'Berlin' variety of *N. stellata*, but also to what is known as *N. zanzibariensis*, which is only another form of *N. stellata*. On the other hand that newer variety, whatever its origin may be, and no doubt that too is a form of *N. stellata* or a cross with another species—*N. pulcherrima* is that to which I now refer—is quite an evergreen Lily, keeping its roots, and hence some, if only a few, of its leaves during the winter season intact. This variety can be divided in a similar way in the spring, but it does not at once start off into such a rampant growth. We increase *N. gigantea* also from its young tubers; but when a pod of seed can be secured—well ripened—that is a better method still. Then from germination until the flowering stage is reached the growth never ceases, but increases in rapidity and vigour.

Raising Seedlings.—Of this Lily, *N. gigantea*, I have sown the seed in October and flowered the plants in the April following within about six months from germination. Sometimes the seed of this and other Lilies ripens unobserved and germinates upon the mud. It is well, therefore, never to cast out the soil without a close examination after seedlings. After fertilisation has taken place the pod sinks below the water, where it matures and eventually bursts; the seeds then float for twenty-four hours or so, and afterwards sink to the bottom, and germination in due course takes place. Hence in order to secure the seed a close watch must be kept upon the seed-pods. A few years back I sowed the seed of the type of *N. stellata* in February and flowered the plants in about four months' time. I mention this merely to point out the short space of time that elapses by adopting this means of increase. Of the 'Berlin' variety of *N. stellata* I have never been able to secure any seed. It is to be traced in the pod, but never appears to mature. In sowing the seed we prepare ordinary seed-pans in which the drainage holes are plugged and about an inch left for water only, the soil being as advised for the plants when put out. These pans are stood upon the hot-water pipes in a warm house, the only attention needful being that

of keeping the water supply maintained. Pricking off the seedlings takes place as soon as the young plants can be safely removed by means of a pointed stick, when they are at once put into small pots, one plant in each: these are then sunk into warm water in a tub. One more shift is given them into 4½-in. pots, and by the time they are well established therein the tanks are ready for them. We have attempted cross-fertilisation, but thus far we have not had any success worth mentioning. This may possibly have been caused by the comparatively cool treatment that has been followed on the whole. Attempts have been made, too, with the view of securing a hardy Blue *Nymphæa*, but in this, so far, we have also been disappointed.

Insects &c.—It must not be surmised that because these Lilies are water plants no trouble is given to the cultivator on this score. The aphis family, of course, finds a congenial home where it can. In this instance it is the black form that occasions trouble upon the leaves, whereon they increase with surprising rapidity. If washed off by means of a syringe it matters not, for they soon regain their positions. (They appear to have accommodated themselves to the situation and acquired the art of swimming.) The best remedy, we find, is to treat them to a process of fumigation with short intervals only. It is possible to drown them, if not to destroy their eggs, when thus stupefied. We are also troubled with the small water-snails, for which a weak solution of lime is a good remedy. Injury is also done by another aquatic insect upon the under surface of the leaves, but I have not been able thus far to fix this pest. I have alluded to the use of manure in the soil, and I have advised that it be excluded. I found that when it was used, notably in 1901, we had a constant source of trouble with a slimy matter that formed upon the soil, and in due course, when sufficiently charged with air, it arose to the surface. When it so happened that this matter came into contact with the under side of the leaves it was sure to injure them by causing spots in the form of decay, which spread rapidly and soon spoiled the foliage. I do not know to what else I can attribute this trouble. It is quite certain we had none of it when no manure was used in any form whatever. Under natural conditions manure does not appear at all essential. Then the only likely stimulant would be any decaying vegetable matter and not a fæcal manure in any sense of the term. Hence I am fully determined not to use any in the future.

For Use as Cut Flowers.—The best variety to use in this way is *N. gigantea*, because its flowers will remain open longer in the day: these will last good in a cut state for three or four days. The others are all disappointing in this respect, being addicted to closing prematurely when cut, *i.e.* when cut as fully expanded flowers in the sunshine. They are, however, most satisfactory when cut quite early in the morning, before they expand to any perceptible degree. When so cut the flowers should be placed in the dark, a cool cellar being a good place. Then if wanted—say at the time of a garden party—from three to seven or eight in the evening, the flowers will remain expanded in most reliable fashion. Our method is to fill a tub with water where it is to stand and place some soil in it, so that the flowers can thereby be supported. Then the surface is covered with Water Lily leaves and the flowers inserted. Arranged in

this way they have a very pretty effect. It is not advisable to break the backs of the sepals in order to try to retain the flowers expanded for a longer time.

Change of Water in the Tanks &c.—The simplest way to effect this is to provide a tap from which a gentle trickle can be frequently left running. If not in any way changed the water will stagnate. We like to have a few gold and silver fish in the tanks: these gain their own livelihood and assist in clearing away what might otherwise be a nuisance.

Varieties.—The following four varieties are in every respect excellent. I consider them to be *par excellence* the best of the Blue Nymphæas.

N. stellata, Berlin variety.—I first obtained this beautiful and most floriferous Water Lily from Mr. F. W. Moore, V.M.H., Royal Botanic Gardens, Glasnevin. I have been informed by Mr. W. Watson, of the Royal Gardens, Kew, that he first noted and secured it from Berlin; hence the definition employed. It is, under our system of cultivation, the most vigorous grower of any. Each crown will produce hundreds of flowers in the season. Upon our best plants we have repeatedly from nine to twelve flowers expanded at one time. These stand up well above the water, scarcely ever less than 12 in. and often as much as 16 in. clear of the surface. It is of a pale blue colour with golden anthers. The blue in this Lily is not at all unlike that found in the Neapolitan Violet. Its fragrance is most marked, and is distinctly that of the Violet. The reverse of the sepals is pale green. The stems of the flowers are short and support the flowers readily.*

N. gigantea.—This fine Lily was given to me originally by Mr. Low, gardener to the Duke of Grafton at Euston Hall, Thetford. This Australian species is quite distinct from any other in every respect. Each flower has a larger number of petals than the preceding variety. In colour it is of a deeper shade of blue. In form the flowers are more incurved, whilst they are also larger. Many of its blooms measure 7 to 9 inches in diameter. Another of its marked characteristics is the breadth of the petals, these being wider than in any other Blue *Nymphæa* that we grow, being at the same time more obtuse in shape. One most striking feature of this Lily is its multiplicity of golden anthers and pollen masses.† Its season of flowering is not so prolonged as in the preceding instance. (F. C. C., R.H.S., June 27, 1900.)

N. pulcherrima.—This Lily is, I believe, a hybrid of American origin. In colour its flowers are distinctly of a darker tint than in the 'Berlin' variety. They possess the same fragrance, but not in so marked a degree. The pedicels, or foot-stalks, are as stout, but on the whole not so long; on an average the flowers do not stand more than a foot above the water. The reverse of the sepals, and the foot-stalks too, have dark lines upon them, making it quite distinct in that respect from the 'Berlin' variety. By reason of its robust growth and excellent constitution I consider this Water Lily to be the best, without exception, for outdoor cultivation in the summer in warm positions, or where the overflow water from the

* This Lily is the first to flower with us, and it is also amongst the latest of any.

† Its flowers are not supported upon such stout foot-stalks, but partake more of a prostrate character, being usually about six inches or so clear of the water.

Fig. 28.—Nymphæa stellata, 'Berlin variety,' showing Tanks under Frames.

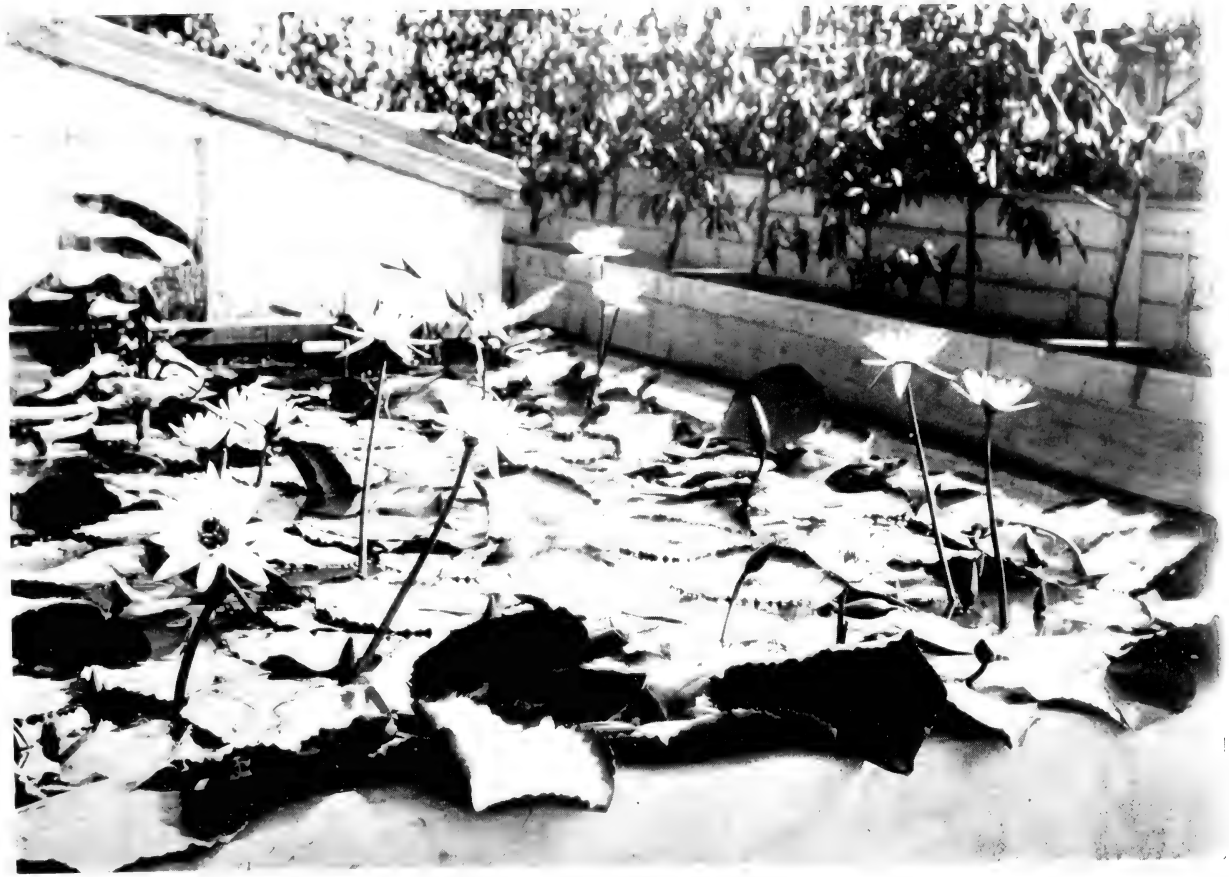


Fig. 29.—Nymphæa stellata, 'Berlin' variety'; the Frame having been removed from the Tanks.

warm tanks can reach it. It is a most desirable variety to grow. (A. M., R.H.S., July 17, 1900.)

N. 'William Stone.'—Like the preceding, this is a hybrid, and of American origin. It has the same features, so far as I have been able to judge from one season's trial, as *N. pulcherrima*. The flowers are of a darker shade, being suffused with purple, whilst the colouring of the anthers is more marked and of a darker tint—golden yellow. It is equally as floriferous and possibly more sweetly scented. As grown at Gunnersbury it is extremely vigorous. (F. C. C., R.H.S., May 28, 1902.)

N. zanzibariensis has not proved so satisfactory with us—possibly it requires more heat. In colour it is of the richest possible blue, but the flowers were sparingly produced, and its constitution not first-rate.

N. scutifolia and *N. capensis* (so called) are merely varietal forms of *N. stellata*, so far at least as I have been able to form an opinion.

N. gigantea Hudsoni.—Since writing the foregoing description of *N. gigantea* I have been successful in raising from seed a decidedly improved form. It is a true *N. gigantea*, but of finer proportions and more robust habit. The flowers are larger, often measuring up to $10\frac{1}{2}$ inches in diameter; the petals are broader and more massive; whilst the stems of the flowers are very much stouter, so much so that the flowers are borne erect as compared with the type. The colour, too, is of a deeper tint of blue. It received a First-class Certificate on July 21, 1903.

HORTICULTURAL EDUCATION IN GREATER BRITAIN.

By R. Hedger Wallace, F.R.H.S.

It is not my intention to-day to go over the same ground that was covered last year in the lecture on Horticultural Education, as it is the common ground which has so often been taken up by various authorities, great and small. My desire rather is to direct your attention to what is being done in our colonies and dependencies in respect to horticultural education, because I hold the opinion that horticultural education in the motherland has, or should have, two aspects: *i.e.* the training of those whose sphere of work or labour will be within the borders of the old country, and also of those who will be dwellers and workers in some part of Greater Britain. The latter aspect, I am sorry to say, we rather neglect, and even ignore, in our courses of instruction at home, and my aim to-day in sketching and drawing your attention to the work undertaken in various parts of the Empire is to induce all who are interested, and specially those who are in any way responsible for any form of horticultural education, to give the needs of the future colonist and tropical planter some attention as well as the needs of the British horticulturist.

There are, of course, difficulties in the way, but it has been well said that difficulties are made to be overcome. In making our survey I would ask that one or two points might be borne in mind. First of all there is the immense area of the British Empire, that is, of the Colonies and other non-contiguous territory under the British flag, this area being practically a hundred times as great as that of the Mother Country.* As this territory is scattered over the face of the globe, there must also be very great diversity in respect to the two great horticultural factors, soil and climate. Then the density of population must have its influence on horticultural interests in this area, especially when we find such variations as seven persons to the square mile in the Colonies (including both the self-governing and Crown Colonies), 152 persons to the square mile in India, and 343 to the square mile in the United Kingdom.

The various lands that thus comprise the Empire outside the United Kingdom can be roughly classed into two divisions, *i.e.* the temperate and the tropical. In the former—the temperate—the colonist is himself a worker, and horticultural work is done by men of the same race as ourselves, and to a great extent on similar lines. Perhaps temperate South Africa modifies this general statement, for there, when possible, the manual labour of an inferior race is taken advantage of. In tropical lands, however, the white emigrant or sojourner does not, as a rule, personally labour, and his knowledge of horticultural details must, therefore, be of a different order from that of the natives. Again, the horticultural requirements and knowledge of the natives themselves vary, and no general statement could be made to apply with equal force, for example,

* Mother Country, 120,979 square miles; Empire, 12,043,806 square miles.

to the Indian malee, or gardener, the West Indian Negro peasant, or the so-called "farmer" of the West Coast of Africa. In temperate countries, as at home, the cultivation of the garden is a minor industry when compared with the cultivation of the field, but in tropical countries the larger part of the cultivation carried on is that of the garden, because where soil and climate are very productive, and if labour be available and be intelligently applied, such cultivation produces greater proportionate results than elsewhere. Some of the largest productive industries in the tropics are, it may be said, horticultural rather than agricultural; for example, Tea growing in Assam; and this fact we popularly recognise by calling land under such a crop a Tea garden instead of a Tea farm.

The principles of tropical horticulture have, I fear, received even less attention in this country than those of colonial horticulture; yet it is a matter of very great importance to this country, for although certain articles that formerly were exclusively of tropical origin are now being produced in great quantities in the temperate zone, the fact remains that the great manufacturing regions in the latter zone are becoming more and more dependent upon tropical territory for the raw materials for their manufactures and for certain classes of foodstuffs and food adjuncts. It is, therefore, much to be desired that some public body in England would undertake the systematic study of the horticultural possibilities and necessities of Greater Britain, temperate and tropical; and to such a body we could in due course with safety look for guidance as to the nature and extent of any possible training at home for work abroad. Whether such a course would be beneficial or otherwise is not, I think, open to question. Before, however, any action can be taken it is advisable that we have a general idea of what is being done in regard to horticultural education beyond our shores, and with this object in view I propose to place before you some data bearing upon the work undertaken in the Dominion of Canada; the West Indian islands and mainland; Africa, West, South, and East; India; and Australasia.

Beginning with Canada, we have here a temperate zone where horticulture is understood in the same sense as we do. Population is, of course, a factor (varying as it does from 51 persons to the square mile in Prince Edward Island to 0·4 of a man in British Columbia) in respect to the attention given to horticulture, and it is a noticeable feature in Canadian schemes that almost the total amount of instruction in horticulture that is given is intended to directly benefit adults who already have had some experience in land cultivation. Courses of instruction in the theory and practice of horticulture are given in Canada, as far as I can learn, at two institutions only, and both of them are provincial, namely, the School of Horticulture at Wolfville in the famous Apple-producing Annapolis valley in Nova Scotia, and in the Horticultural Department of Guelph Agricultural College in Ontario. The Government of each of the Provinces in the Dominion endeavours, I learn, to diffuse horticultural information among those likely to benefit. In Quebec horticulture is taught in three of the Government agricultural schools; the *Journal d'Agriculture et d'Horticulture* is a subsidised organ, and annual grants are given to various associations of fruit-growers who hold meetings from time to time and discuss horticultural subjects; while

experimental orchards—a term which includes the growing of small fruits—are established as object lessons in various parts of the Province. Practically the same kind of work is done by the Provincial Government of Ontario, this Government also sending experts and specialists to give demonstrations and practical instruction. All the other Provincial Governments, in respect to the work they undertake in the interests of horticulture, follow more or less on similar lines. The Canadian cultivator usually desires and asks for information on two points, viz. What fruits shall I plant, and how shall I cultivate them? The answer to these questions he obtains through the provincial horticultural stations, the subsidised provincial horticultural magazine, and also at the meetings of the local and provincial horticultural associations. These men, who are opening out the land in Canada, do not trouble themselves very much about the theory of any operation; but when they do, and laboriously evolve one, it is apt to be as startling as it is unscientific. What they do desire is guidance in performing practical horticultural operations. The work of the Provincial Governments, as outlined, is in turn emphasised by the Federal or Dominion Government, which has five experimental farms located at widely distant points and in very different climates, and in each of them there is a horticultural section. The annual reports and bulletins of these stations are sent free to all who apply for them, while trained men from them are also sent to discuss, with fruit-growers and others, subjects pertaining to horticulture. Having to appeal to adult established cultivators, the system of horticultural education in Canada is, therefore, mainly that of practical demonstration, leaving the why and wherefore to be learnt, if desired, through specific questionings addressed to the scientific staff retained by both the Federal and Provincial Governments, such as botanists, entomologists, chemists, and others.

Passing from Canada to the West Indian group we enter the region of tropical cultivation. Instruction must here be so arranged as to appeal to two distinct classes, *i.e.* the Anglo-Saxon estate proprietor or manager and the Negro peasant proprietor or labourer. The West Indian Imperial Department of Agriculture which costs the Home Government about £17,000 yearly, is mainly occupied in furthering horticultural interests. There are three botanic gardens and nine botanic stations in this area, all intended to afford practical instruction in the cultivation of tropical plants, to be the media for introducing and testing new plants, and to some extent to train men and boys in horticultural pursuits. At work as curators or overseers are practical gardeners trained at Kew, who after some time, when they have gained experience in tropical cultivation, are able to go about and instruct the people all over the country. Through the initiative of the Imperial Department of Agriculture in the West Indies, elementary school teachers in this area are also now being taught the elementary principles of horticulture: that is, they are being called upon to have some acquaintance with the growth and treatment of plants and their uses, and in turn to teach the subject in their schools. All schools are further being induced to start box and pot cultivations, as a starting-point for school gardens, in which the pupils at the elementary schools will receive instruction in the preparation of the soil, formation of seed-beds, raising

seedlings, thinning and transplanting, shading, watering and weeding, propagating, and other practical details. In addition agricultural schools of various types have been started, so that instruction in agriculture or horticulture may reach every section of the community. This West Indian area is also provided with a scientific advisory staff, conferences and meetings are held, Government experts lecture and demonstrate, and various official publications are issued and distributed. In the West Indian group it will be noted that the interests of horticultural education are furthered in many ways: for instance, through the teaching in elementary, secondary, and special schools, through the object lessons which botanical gardens and stations and experimental plot provide, and through conferences and publications, and the utilisation of the services of experts and specialists.

Keeping still within the tropics, when we cross over to our settlements on the West and East Coasts of Africa it would appear that little is done in this region besides maintaining botanic stations. There are two stations in Sierra Leone and one at the Gambia. At the Gold Coast there is a botanical and forestry department, an old and a new botanic station, and small school plantations. Lagos has two model farms and a botanic station, and Southern Nigeria a botanical department and experimental plantations. A botanic station, as has already been indicated, is a fixed but progressive object-lesson for the community, a means by which economic plants are introduced, cultivated, acclimatised, and distributed, and in a sense also it is a practical school for the labourers engaged on the station. On the East Coast of Africa there is a botanic station at Uganda and another at Zomba, which do the same kind of work as the stations on the West Coast. Off the East Coast there is another botanic station on one of the islands for the Seychelles, and in Mauritius there is a botanic garden, a Station Agronomique, and a horticultural training school, while much useful work is done in the distribution of plants and seeds among growers.

Coming to the group of warm, temperate, and sub-tropical colonies in South Africa, we find here the same problem which presents itself in the West Indies, *i.e.* the presence of two diverse races, with the further provision that the dominant position of the white race is much more marked in South Africa than in the West Indies. Horticultural education in this area, to whatever extent it exists, is not intended for the black races, except the instruction given at certain farm schools and mission schools. In Cape Colony the principles of horticulture are taught at the Elsenburg College, and the Government, as in Canada, gives grants to botanical gardens and societies, recognises the work of boards of horticulture, issues a journal, and retains the services of various experts and specialists on behalf of horticulturists. In Natal, though there is no direct teaching of horticulture, the Government indirectly advances, as at the Cape, the horticultural education of the rural population by supporting an advisory staff, a Government farm station, publishing a journal, and giving grants in aid to societies. In Rhodesia grants in aid to societies are also given and experimental gardens are maintained. Although it is too early to say what will be done in our new colonies—the Transvaal and Orange River—yet this year over £20,000 has been placed to the credit of the Department of Agriculture

in these colonies to be expended, among other things, on Government gardens and the maintenance of a staff of fruit and other experts. It is obvious that most of the educative work done in South Africa is intended mainly to assist, as in Canada, men already interested in soil cultivation, and not to train raw beginners into a calling or handicraft by which they could earn their living. This of course applies to the white race alone, and I must leave the question untouched whether the native could not be trained to become an expert garden cultivator.

Passing on to India, we enter again in this area into the tropical belt. Here we have a number of native races that are perhaps the most forward and advanced in the East, and among them the calling of a gardener has long received due recognition. The botanical and other public gardens in India in a sense may be regarded as training grounds for gardeners who can meet European tastes; but they can do little in this way, and perhaps little is needed, for gardens as such were cultivated in India long before the advent of Europeans. The total expenditure on these gardens is over £27,000, and the provinces rank as regards support given in the following order: Bengal, North-Western Provinces and Oudh, Punjab, Madras, Central Provinces, Bombay, Burma. In the first two provinces named are located the well-known gardens at Calcutta and Seharunpore. It may be noted that in British India about 3 per cent. of the total crop area is under orchards and gardens, and that the acreage so occupied is about the same as the acreage under Barley and also that under Gram, both of them important crops. Scattered through the various provinces there are also a number of experimental farms and gardens, all of them utilised for distributing plants and seeds, and they may be regarded as fairly satisfactory demonstration centres for the native community. Nothing educational, however, is done in India for Europeans from the horticultural point of view; certainly there is no demand for Europeans as gardeners; yet the opportunity of obtaining a knowledge of horticultural principles as affected by tropical conditions would be valuable to all who live and work in the country, and have to be responsible on Tea, Coffee, and other estates for what are practically a series of horticultural operations. The difference also from the horticultural point of view that exists between the natives of India and Africa may be said to be, that the former know a good deal about the practice of gardening, while the latter know little if anything at all; and that though some of the methods of the Indian gardener, local and climatic conditions considered, may be open to improvement, he generally knows his business; the African, on the other hand, has to be taught all the practical details that make up the ordinary routine of horticultural operations.

In Ceylon, as an important educative factor, there are the Royal Botanic Gardens at Peradeniya, which, besides a scientific director, has various specialists on its staff. Mr. Carruthers, writing to me from these gardens on horticultural education in Ceylon, says: "This department helps the Department of Public Instruction to carry out 'nature studies' in the native Singalese and Tamil schools. In addition to this our garden, of which there are five branch ones, is each a demonstrating medium of horticultural methods, and we sometimes send out skilled gardeners to instruct in grafting, budding, &c., and other horticultural technique.

The Singalese is not by any means a born gardener, and suffers from a lack of interest in these things. The Tamil is also not a keen gardener. The methods of horticulture are naturally quite different from those of Europe. There is in Colombo an agricultural school which teaches horticultural subjects, and there is a travelling inspector in connection with the native schools and 'nature study.' The lack of water during a large period of the year in the major portion of the island tends to discourage gardening, but agri-horticultural shows at various centres and times help in the other direction." I may add, supplementing Mr. Carruthers' communication, that I believe the work at the Colombo School of Agriculture has been reduced, and that some of the money that was allotted to it is now expended on school gardens.

Going next to the Straits Settlements, we find botanical gardens at Penang and Singapore, and Government experimental gardens in the Federated Malay States, all of them demonstrating media. In respect to horticultural education Mr. Ridley, the Director of the Singapore Gardens, writes me: "We have done nothing here as yet. In fact we have not got the kind of people here to whom any such instruction would be of use, the only horticulturists being English planters in the Malay States and Chinese, who would not attend any lectures. I proposed once to start a course of agricultural lectures, but could only find one possible auditor."

In Australasia the methods of furthering horticultural education are somewhat similar to those employed in Canada, the principal object being to benefit adults who are already land cultivators. In Tasmania, where fruit growing has been long established, little is done besides providing inspectors for codlin moth and vegetation diseases. No special opportunity is offered to young men in Tasmania to receive a training in horticulture, and the same may be said about Western Australia. The latter State, however, provides experts and issues bulletins; but this expenditure benefits, as already indicated, those at work on the land, and does not provide a young man with a calling. In a country like Australasia, with about two persons to the square mile, there is at present little call for the professional gardener; every man must be, more or less, his own gardener. All the States in the Commonwealth, however, it may be noted, retain the services of specialists and experts, subsidise horticultural societies, encourage meetings and discussions, and support farms and gardens that are intended to be object lessons for the community. At the agricultural colleges in South Australia, Victoria, New South Wales, and Queensland horticulture, to some extent, is studied by the students. Market gardening, as a branch of general horticultural practice, does not seem to attract the Australian horticulturist; and it may be added that a market garden in Australia is seldom termed such, the generic appellation being "Chinese" garden; a fact which clearly indicates the race into whose hands this branch of horticulture has fallen. Victoria is, I believe, the only State in Australasia which has a horticultural school where young men can be trained as practical horticulturists, and the course of instruction therein is both practical and theoretical, the former preponderating. Some instruction in orchard training and fruit and vegetable culture is given to students at the New South Wales experimental farms and orchards, and to some extent also on the Queensland experimental farms. In all the

schemes of horticultural education current in Australia it will be found that the dominant note is to provide a man with a working knowledge of horticulture for his own needs and benefit, and not to qualify him as a specialist to hire out his services. In New Zealand the same features are to be found in respect to horticultural instruction as are common to the States of the Commonwealth, excepting, however, the Victorian School of Horticulture, which, managed by the Board of Horticulture in that State, stands alone as the only experiment in this direction that has been attempted, and which so far has been comparatively successful. New Zealand has an agricultural college, a number of experimental farms with horticultural sections, and a staff of scientific specialists and technical experts, all affording, in some degree, instruction in the theory and practice of horticulture to those desiring such information.

It must be borne in mind that in all new countries there are to be found men at work on the land who have had no previous training as horticulturists or agriculturists, but who, having a natural liking for the work, have acquired their information as they went along. It is to help these men that schemes of horticultural instruction are organised in our great self-governing colonies. Such men, like other people, are apt to experience difficulty in carrying into successful effect written directions for pruning and other common horticultural operations; but if they once can see how it is done their perplexities vanish; and so the main feature in colonial horticultural schemes is that the instruction needed will be given through experts, who visit individual holdings and perform whatever operation is in doubt in the presence of the farmer or orchardist and his neighbours. There are also people on the land, it must be admitted, who are too listless to acquire information, and seem content to fritter away their lives in watching the outcome of a sequence of misdirected efforts. Such men do not desire horticultural education: they need a volcanic eruption, and this a Government department cannot command.

Before we can complete our survey I must add that in our tropical South Sea possessions we return once more, as in Fiji, to the Botanic Station, as the educative medium in respect to horticulture. The aptitude for gardening shown by the various races so materially differs where these stations are placed that the effect of such efforts must also vary.

I have now endeavoured to place before you a short *résumé* of what is being done at present in the interests of horticultural education in Greater Britain. The question still remains, Can we not take a broader outlook in our educational schemes at home as affecting horticulture? We cannot, of course, in England, take any action in respect to horticultural instruction for natives—that must be left to local effort—nor can we effect such schemes as are intended to benefit those already settled on the land in our colonies, and it would not be advisable if we could. It will not be disputed, I think, that our schemes of horticultural instruction at present are all directed towards training men and women in a handicraft, and to make them intelligent and enlightened workers in a community which is able to hire and desires their special services. Why should not those who go abroad be able to obtain similar instruction, though not so advanced?

A training at home in the theory and practice of horticulture would,

I believe, be quite suitable for the future resident in any of our temperate colonies, provided that some commonsense is exercised by the teaching body or teacher, and that the prospective colonist possesses the virtue of adaptability; for an open mind quick to observe and ready to adopt new ideas never goes hand-in-hand with rule-of-thumb methods. A clear understanding of the points of similarity and difference between the natural conditions of the old and new surroundings is what is desirable on the part of every settler from the old country; and I believe that in this country, besides efficient manual training, the future settler could get such direction and equipment as would fit him to readily realise local conditions wherever he settled, and to adapt himself to these conditions. Experience of local conditions is, of course, a matter that cannot be transplanted or transmitted, while imitation of work accomplished elsewhere at once indicates faulty training and reasoning. Too often, I fear, our courses of training in horticultural science are dominated by what I might term the superior person's point of view. Such courses are usually formulated by professional scientists, and practically say to the beginner, "You should study this or that because it will be good for you in your calling." I believe this is beginning at the wrong end. I would rather go to the practical man and ask him what is the nature of his difficulties and perplexities, and what are the points he would welcome, the assistance that science might be able to give, and then the scientific course should be so limited and arranged as to afford him the help he desires. I therefore think that the colonial point of view—namely, to give a man not so much what probably might be good for him from the educational standpoint as what from experience he knows he lacks, and therefore desires—is a commendable one. The second question I would put before you is, Can we give any adequate training in England to those who will engage in horticultural work in the tropics? This is, I admit, not such an easy question to discuss as the first; yet it resolves itself into the simple question, Can the experience of working with tropical plants in a hothouse at home be of any service in preparing a man to undertake the successful and profitable cultivation of tropical commercial crops? Although some authorities consider such experience to be of value, I cannot uphold it, and I do not think such will be the general opinion.

All will agree, I think, that it would do no harm if the young learnt the rudiments of the craft of gardening, and obtained some practical knowledge of horticultural methods during that period of their life which is, or should be, devoted to the instinctive process of learning what are their own powers and their relationship to the animate and inanimate world. To know how to graft, for instance, is an acquirement which will be serviceable to a man not only in this country but also should he go abroad into tropical or temperate lands. Horticultural teaching, if it is to take this wide outlook, must depend more on the application of principles, and less on the exercise of mere physical energy. Too many of our practical courses of instruction, I fear, are little more than a series of physical exercises. Educationally, after the right way to handle a tool or do an operation is satisfactorily learnt, mere drill or exercise in such work is simply wasting of precious time, for it is outside the scope of any scheme of technical instruction to turn out ready-made journeymen.

The true value of technical education, I take it, is to give such a foundation and training that a youth may profit by his experience and become in due course an intelligent, enlightened, proficient, and progressive journeyman in his craft.

It must also be admitted that there is often as much waste on the theoretical side in a horticultural course as on the practical, especially when the idea is entertained that men who are to gain their living by the practical culture of gardens and orchards should be able to do their own soil and manure analysis, and other scientific examinations; in fact, be their own chemist, botanist, vegetable pathologist, &c. To equip them to do this they are usually called upon to spend part of their limited time in doing elementary chemical analysis and in making sections of tissues &c. for microscopical examination. Such work had better be left by horticulturists to specially qualified and trained men who have had the varied and lengthened experience which qualifies them to be recognised as experts in some one department, be it soil or manure analysis, fungoid plant diseases, or insect attacks &c. What is really wanted in the training of the future practical man is that he should possess that knowledge of the theory of his calling, *i.e.* of the scientific principles on which it is founded, which will enable him to recognise the value of an appeal to science. He therefore can so appreciate the work of scientific specialists that he applies to them for specific information, and he utilises the information so gained in conjunction with his own personal experience and practical knowledge.

This knowledge of the principles of horticulture is a useful asset, whether the horticulturist works under tropical or temperate conditions. So also is a knowledge of the methods of grafting, budding, and the other details of plant manipulation. What, however, is desirable in the interests of those who are going abroad is that the general outlook be widened, and this could be best done by making comparisons, which perforce must be chiefly theoretical. When a man learns to do certain things under certain conditions in this country, he should at the same time learn what he should or could do under other conditions. In no other country in the world can this information be so well obtained or supplied as in England, where so many men are to be found who have practised horticulture in all parts of our world-wide Empire and under every possible variety of conditions. When the Dutch are able to give in Holland courses of instruction in colonial and tropical agriculture and horticulture, why cannot we do the same? When the Austrians, who do not possess colonies of their own, find it so advantageous to study the agriculture, horticulture, and economic products of other countries and their colonies that the premier position is generally conceded to them for such studies, is it not a matter of surprise that the United Kingdom, which is the centre of the greatest empire in the world, has so long neglected her opportunities?

I have now endeavoured to place before you a short *résumé* of what is being done in the interests of horticultural education throughout the Empire, and I have also noted some of the considerations which, to my mind, arise from such a survey. There are, no doubt, many points in this paper open to question, and therefore to discussion, and such would be welcome, for publicity usually begets interest; and if this be aroused progress is assured.

HOW TO BOTTLE FRUIT AND TO MAKE FRUIT-BOTTLING PAY.

By Edith Bradley, F.R.H.S.

The importance of the preservation of fruit as a home industry is becoming more marked each year; and whether it be done in large quantities when the season is good and the market glutted, or whether for home consumption only, it is but right and just that more attention should be paid to a more systematic preservation of fruit than has hitherto obtained. Two methods are open: the fruit can be dried or evaporated, and so stored in a very portable form, or it can be bottled or sterilised, and this form of preservation lends itself to many variations and offers endless scope for experiment and effect.

It may be asked, why should the subject be so important? Because we are a fruit-loving and fruit- and vegetable-eating nation. The foreigner knows this and sends all sorts of dainty and delicious fruits and vegetables to England, on which he must often make 60 to 100 per cent. profit. Bottled fruit forms a staple article of trade at the stores and in all large grocers' shops; but they are not bottled in England. Why not? Because we have not yet learned to do them well enough, so we support the foreigner as usual!

Truly it is time to "Wake up, England!" and in this case we might say "Wake up, Women of England!" because this is essentially a branch of work suitable in every way for women to do.

Recognising these truths early in its history, Lady Warwick Hostel turned its attention in a most practical form to the preservation of fruit, and for the last two seasons has been carrying out various experiments in the sterilisation of fruit and vegetables. Acting on the experience thus acquired, it has now brought out a steriliser, called the "Lady Warwick College Steriliser," for fruit, vegetables, jams, and milk which, after very careful testing, has a right to the claim of being a most distinct improvement on existing systems; although a vast field remains open for minute observation and experiment before finality can be obtained.

In the following paper I propose to keep in view three main points:

(1) Why we should bottle fruit.
(2) The different methods of doing it.
(3) How to make it pay.

1.—Why we should Bottle Fruit.

First, to be independent of the foreigner. Secondly, to spend the money on English produce (therefore on a home industry), instead of sending it to France, Germany, and other Continental countries. Can it be done? Why not? Fruit-growing has been and is being taken up most extensively. Year by year, according to the agricultural returns, an increasing acreage is being laid down in fruit.

Take, for example, the Vale of Evesham. The last twenty years have seen the most extraordinary development in market gardening in this favoured spot—although this year it has suffered cruelly from late frosts, like most other places in England. I was told only the other day that the average rent per acre is £4, and men pay this willingly, because they can make a living out of it. Not only so, but what is, to my mind, so suggestive and important is that the young men hardly ever leave the Vale for towns, but take to market gardening from boyhood, as it were, by instinct. Surely this speaks volumes on the problem of rural depopulation.

A large retail fruiterer, speaking to me quite lately on the subject of the fruit trade, said that there was an extraordinary difference in the sale of fruit, especially amongst the working classes. A few years back if he sold a bunch of bananas in a week he considered it quite a lot, now he sold dozens of bunches; and when fresh fruit could not be supplied the demand began for bottled fruit, especially Apricots, for which people were willing to pay 1*s.* 6*d.* for a 20-oz. bottle.

The enormous exhibits of bottled fruits and vegetables at the Army and Navy Stores, and other co-operative houses, and Italian grocers, show what the demand must be, but, alas! most of it bears a foreign label.

Then, again, to touch only upon jam, tons of fruit are preserved in this form every year, and the inferior grades are made into pulp, which can be easily done, and stored away to make up into mixed jam for cooking and other purposes when the slack season comes round. Pulp is also largely used in the confectionery trade.

The advantage of good bottled fruit is that it will keep for a considerable length of time. (Apricots and Gooseberries, bottled in 1901, were shown to the audience.) Therefore, in years of plenty, when there is a glut of fruit, advantage should be taken to bottle great quantities, so that it can be reserved for bad seasons, such as this will be, and as the last two have been. This remark applies both to private persons and to the trade. In winter we are only too glad to get bottled fruit for pies and puddings as well as for dessert, as it not only gives variety to our food, but is also most valuable from the point of view of health.

I now come to my second point.

2.—The Different Methods of Bottling Fruit.

In the "good old times" of stillrooms, and of herbs and simples and decoctions of all sorts, no doubt bottled fruit was "laid down" in dozens in the capacious cellars and storerooms and cupboards which occupied so large a space in the old-fashioned English home. How changed are all our ways! A modern flat, with its space reckoned by inches, would not have been tolerated by our grandmothers, neither could storage room be found for bottled fruit or any other commodities in anything but the minutest quantities.

But to return: How was fruit bottled? No doubt the original method was in a long-necked bottle the contents of which were heated in an oven or saucepan and the bottle was corked and tied down with bladder. This

was continued in principle, but with variations, by large firms such as Crosse and Blackwell, Lazenby, &c.

With the introduction of steam and the discovery of its adaptability to various purposes, extensive plant was laid down in factories, especially in France, Germany, and Switzerland, and fruit was bottled by the ton and placed on the market.*

The extensive demand for sterilised milk has led to its being done also by steam, and by adaptation the same steriliser can be used for bottling fruit.

The expense, however, of the plant and the skilled work required is a drawback to sterilising by steam except on a very large scale. It is

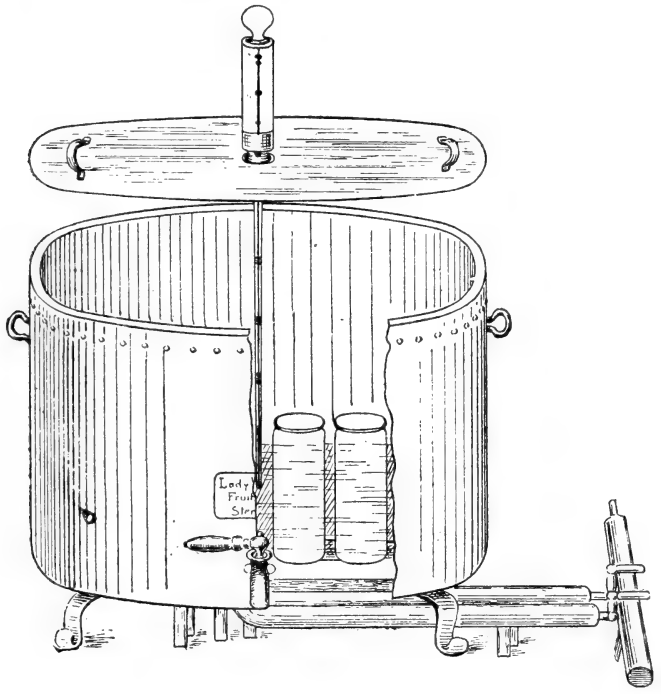


FIG. 30.—LADY WARWICK COLLEGE PATENT STERILISER FOR FRUIT, VEGETABLES, JAMS, &C.

believed that the patent steriliser which has been brought out at the Lady Warwick Hostel will meet this want of a simple apparatus for bottling fruit. Before describing it, however, it may be well to pause and explain what the process of sterilisation is. Briefly, it is to make sterile or deprive of vitality the bacteriological germs in fruit and vegetables which cause decay and putrefaction. If these germs are destroyed and kept from approaching the sterilised object again, it will keep perfectly sound and good for a considerable, possibly an unlimited, time. This result is brought about by the following process. The article to be sterilised is packed into a glass jar, which is then filled with water; heat

* In the catalogue of a French firm I saw the other day an illustration of a corking and capping machine which was guaranteed to do 600 to 700 bottles an hour!

is applied to raise the contents to a sufficient temperature to kill the germs; the hot air expands until it reaches the automatic air-tight capsule (which at a certain temperature is tightly screwed down or fixed by one means or another). The temperature is kept for a certain time at a certain height (according to the kind of fruit undergoing the process), then the bottles are either lifted out and put into a cool place to get rapidly cold, or else cold water is turned into the machinery whilst the bottles are in it. With the decreasing temperature a vacuum is created, and unless the capsules are imperfect or imperfectly adjusted, and so admit the air, the contents of the jar, as before stated, should keep for any length of time.

The first appliance brought to my notice for this work was a small vessel which only held a few bottles, and which, though useful as a means of arousing interest, was inadequate for bottling on a large scale.

Having started with one of these sterilisers, we found the subject deeply interesting, and in the course of a few weeks we turned out some nice samples of bottled fruit. Then we were emboldened to send a small exhibit to the R.H.S show in the autumn of 1901, for which we were rewarded with a Banksian medal. This was a great encouragement.

Experience and study brought the inadequacy of the pioneer machine more and more home to us, with the result that last October I was advised to bring out one which embodied our requirements in a portable, tangible, practical, and workmanlike form. For this I have applied for a patent, calling it the "Lady Warwick College Patent Steriliser." I am glad to be able to say conscientiously that we have used the one now before us continually since October, and it has never failed to come up to our requirements. It claims—

(*a*) To carry out the sterilisation of fruit, vegetables, jams, and milk quickly and effectively, at a small expense, in a simple and portable manner.

(*b*) *Capacity.*—It is made in two sizes, *A* and *B*. Size *A* takes 28 bottles, holding 40 oz. each, or 70 lb. of fruit, or fruit and vegetables, or vegetables and milk. Size *B* takes fifteen bottles, holding 40 oz. each, or 37 lb. of fruit, or fruit and vegetables, &c.

(*c*) *Time.*—One to two hours only are required for each charge. The construction of the machine admits of a very careful storage of heat in the jacket, which forms a hot-air cushion, and conserves the heat so well that, after the gas or oil stove has been turned out, in one hour the temperature does not lose more than eight degrees.

(*d*) *Heat is supplied* (1) by a Fletcher's standard burner, which burns about 40 c. ft. of gas in an hour; (2) or by an oil stove of the 'Perfection' type, with two burners, the *B* size steriliser being specially made for the 'Perfection' stove; or by an ordinary kitchen range upon which the steriliser can be placed.

(*e*) *Economy.*—It is estimated to cost about 2*d.* an hour for gas, or about 1*d.* an hour for oil, to sterilise 70 lb. of fruit or vegetables.

(*f*) *Portability and Rigidity.*—The steriliser is made entirely by hand, and the best tinned steel is used. The weight is 44 lb. A strongly made deal case to contain the same and to use as a table can be supplied.

(*g*) *Accuracy of Temperature* (on which everything depends).—This

is obtained by means of a specially constructed thermometer which fits into the lid of the steriliser, with a screw socket, so that the bulb reaches the correct depth, where the actual process of sterilisation is taking place, whilst the reading is at all times clear, and can be seen at a glance, being above the lid.

Price of the Steriliser—*A* size, complete with burner, thermometer, brass tap, and twenty-eight 40-oz. bottles, 6*l.* 10*s.*; wooden case, 1*l.* 10*s.* extra. *B* size, complete with 'Perfection' stove No. 312, thermometer, and brass tap, 5*l.* 15*s.*

List of Bottles recommended.

—	Empty.	Caps and rings	Price full Gooseberries
Churn shape, 1 lb. . . .	1½*d.* each	1½*d.*	6*d.*
Vacuum bottle, 20 oz. . .	4*d.* ,,	1½*d.*	7*d.*
,, ,, 40 ,, . .	5½*d.* ,,	1½*d.*	1*s.* 6*d.*
De Luca bottle 32 ,, . .	4½*d.* } with caps	—	1*s.* 3*d.*
,, ,, 40 ,, . .	5*d.* } and rings	—	1*s.* 6*d.*
Ryland Climax, with glass stopper, 2 lb.	7*d.* each, with caps and rings	—	1*s.* 3*d.*

The right bottle has yet to be put upon the market. One is wanted which is cheap, made of good glass, and with a glass cap, as the metal one is not, in my opinion, satisfactory.

Now I come to my last point.

How to Make Fruit-bottling Pay.

We have seen that the bottles, when full, can be sold retail for from 6*d.* to 1*s.* 6*d.* each, according to size.

Let us take the 40-oz. De Luca bottle filled with Gooseberries as our standard.

The bottle and metal screw and cap cost 5*d.* each.
2½ lb. Gooseberries at 3*d.* lb.=7½*d.*
Approximate cost of gas per bottle ½*d.*; total 1*s.*
Gross profit per bottle=6*d.*

The steriliser holds in each charge 28 bottles, thus giving a profit of 14*s.* each charge.

The steriliser can easily be charged four times a day, as the process takes from first to last 1½ hour to two hours; therefore 14 × 4=56*s.* gross profit.

From this working expenses would have to be deducted.

Labour.

	s.	*d.*
Forewoman, say, 6*s.* a day	6	0
Three hands at 1*s.* 6*d.*	4	6
Depreciation at 10 per cent., say	5	0
Interest on capital 5 per cent. on 50*l.* per annum, *about* 1*s.* a week, or 2*d.* a day . . .	0	2
	15	8

Leaving profit of 2*l.* per day.

Capital.

A large amount is not required.	£	s.	d.
Cost of steriliser with twenty-eight 40-oz. bottles .	6	10	0
One gross bottles, about	3	0	0

An arrangement could be made by which, on the soda-water siphon system, bottles could be returned.

This represents stock in trade. Then something must be set aside for rent of, say, two rooms in private house, and fitting up same. The stock should be held until it can be put on the market to the best advantage, which will be when the fresh fruit is over. Of course two sterilisers going at once would increase profits and not double the work.

This is work which women might well take up in their own private homes, and make a great success of it with industry and perseverance. For instance, two friends could start and make a nice little business of it as a season's trade. Indeed, this paper has all along been addressed to private individuals, not the trade.

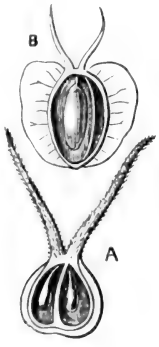
Before concluding I would say a few words about temperatures. These are always difficult, as they vary greatly with the kind and condition of fruit, and the way in which heat is applied.

For *Gooseberries* we have found a temperature of 155 to 160 degrees to be correct. It should be kept at this for about 20 minutes, then the bottles taken out and screwed down, and if possible allowed to cool quickly. Apricots, Cherries, Plums, Peaches, do at about the same temperature, but a great deal depends upon whether the fruit is very young and tender. If so, the temperature must be kept very carefully to 155 degrees. The time for sterilising varies with the fruit: larger fruit —such as Plums—require 25 minutes, Pears 1 hour, Apricots 45 minutes, Peaches 45, Tomatos 30, Rhubarb 20 minutes.

Syrup.—If preferred, the fruits may be preserved in syrup instead of plain water. With the softer fruits, perhaps, syrup helps to preserve the colour. A syrup which is very simple and inexpensive can be made with ½ lb. of the best cane sugar to one quart of boiling water. Boil and strain, and cover the fruit with it.

Bottled fruit ought to be kept in a dark cool place—if possible in a cellar, which is very suitable.

Care must be taken, when putting the liquid into the bottles with the fruit, to fill them right up to the brim.



NOTES ON THE ORNAMENTAL CONIFERS IN THE LOWER THAMES VALLEY.

By A. Worsley, F.R.H.S.

In this short article I can only deal with those *ornamental exotic Conifers* that have been planted as *Garden and Avenue trees* in this district.

Plenty of information can be found in several carefully compiled works dealing with the *Coniferæ* generally, but such works are, as a rule, only studied by a small number of readers, and are not readily accessible to all and sundry who have a garden and wish to plant a few trees. It is to place before such persons, in a condensed form, and free from technicalities, the observations which I have made on the Conifers of this district—their requirements as to soil, and especially their powers of resistance to the varied physical conditions of the suburban districts—that this article is written.

In the average suburban garden it is evident that Conifers have been planted without any knowledge of whether they would succeed in the positions allocated to them.

Every day can be seen, in the grounds of public institutions and of private owners, trees being planted which have proved unsatisfactory in the district, and which can by no possibility give pleasure to anyone.

In treating this subject it should be remembered that as the pall of London's wasted fuel spreads over new areas, so does it become no longer possible to grow certain trees which, perhaps, in bygone years flourished there.

Also that the unwatering of the subsoil by the sinking of deep wells has rendered some soils too dry for certain trees which used to grow in such places, and has at the same time made it possible for Cedars to be planted.

It goes without saying that, throughout the *Coniferæ*, those with yellow or golden foliage require full sunlight to show their beauty, and should never be planted within the smoke-fog area. Those who will have golden evergreens, better plant the golden English and golden Irish Yews; but even these will not stand in the worst districts, although they still do fairly at Isleworth.

I have not attempted to deal with the hosts of garden forms to be found in nurseries, unless such trees have been in cultivation long enough for us to see them in a large state. Many of these new trees are of extreme beauty when small, but with them we live in a land of promise, not of achievement.

The Cedars.

All forms flourish in dry soils, even within the smoke-fog area surrounding London. *Cedrus Libani* has proved itself to be the finest evergreen tree among the Conifers for these situations, and is too well

established in popular favour to need any recommendation. There is a form possessing the pendulous apices characteristic of the Deodar, which makes its new growth in the spring fully a fortnight before the type. This new growth is of a most beautiful emerald green. At this stage of growth this variety is very distinct from the type, although in winter they are not easily distinguishable. I do not think that this variety is a recognised "Garden tree," as I have only seen one specimen; it seems more probable that it was merely a chance seedling which has shown a variation from the type. *C. L. pendula præcox* would be a good descriptive name.

The finest grove of Cedar of Lebanon which I have ever seen is on the lawn fronting Highclere Castle, near Newbury, in the watershed of the river Kennet. As an example of how well this tree will do within the smoke-fog area I need only cite the splendid specimen which stands in Kew Gardens right against the Brentford Gas Works.

C. atlantica is, from a distance, only distinguishable from the Deodar by its sub-erect and rigid branches. It grows faster than any other Cedar, and some judges prefer it to any other. It yet remains to be seen if it is of such permanent merit as to warrant this good opinion; for the tree may not prove so long-lived as its relations, and possibly when fully grown heavy snow may break down the boughs. The avenue at Kew promises great things, and is already a feature of the gardens. The variety *glauca* is a splendid garden tree in a small state.

C. Deodara, the sacred Cedar of the Himalayas, is, in my opinion, only second to the Cedar of Lebanon in beauty and utility. It has all the stubborn hardihood of the Yew tree, and even after our most perishing easterly gales, when all vegetation looks withered and brown, the Deodar shows not the slightest trace of repining, nor after the hardest frosts.

The peacock is especially partial to the Deodar. Although he may have been reared in England, and perhaps his ancestors for generations, and neither he nor they have ever seen a Deodar, yet, if he be turned into a park containing a single Deodar, he will infallibly be found roosting in it the very first night.

There are strong inducements of a physical nature which account for this seemingly remarkable *rapprochement*. The Deodar and the peacock have grown up together in their ancestral home for more years than any of us would care to count, and the tree forms an ideal roosting place for the bird. To what extent, if at all, interdependence exists I am unaware.

In a young state the Deodar is somewhat glaucous, and I have recently had my attention called to some young trees of a markedly glaucous character. If, as I hope in this case, such glaucous foliage remains (at least in part) as a fixed characteristic, we shall have a garden tree of great beauty and novelty. In this variety the young wood is white on the top side of every branch—a character shown off to great effect by the drooping branchlets.

Several other varieties are known in gardens. The semi-decurrent form, *C. Deodara robusta*, is unrivalled as a garden tree for growing on a lawn near the house. This variety is slightly glaucous at all times.

The Deodar does well at Kew, and the fine avenue of these trees, as

yet in their infancy, is already one of the great beauties of the Royal Gardens.

Chamæcyparis [Lawson Cypress, &c.].

Although enormous quantities of these trees have been planted in the suburbs of London (what suburban garden is without one?), yet it is very rare to find a single good specimen 20 ft. high. Such good trees do exist, but they cannot constitute one per cent. of those planted. This general failure must be, in part, attributed to the fact that these trees lend themselves to propagation in other ways than by seeds. To save time, or to keep them true to name, nurserymen have had recourse to these other means, and have distributed vast numbers of such plants, hardly any of which could, under the most favourable circumstances, have ever made really good trees.

Even when raised from seed their behaviour is eccentric until they are about ten to twelve years old. I believe the aridity of the air in the lower Thames Valley during the early summer is detrimental to this section; not unfrequently they will present a seared and unhappy look until quite late autumn, when the damp airs bring about a recovery. In the softer climate of Bournemouth they thrive much better.

Raised from seed much variety is apparent, and the number of garden forms is becoming bewildering.

C. Fraseri behaves more like a species than a garden form, and in some soils will thrive well where no other form will do more than linger. In my garden I have never had a single *Fraseri* "look back," much less die or become unsightly, and I have never seen a specimen out of health anywhere. From this I take it that this tree is of great vitality and should be extensively planted in gardens even by those who have been disappointed with other forms of *Chamæcyparis*.

C. nutkaensis is especially disappointing in this district.

C. Lawsoniana lutea is a glorious garden tree where it will do well; but this is only in favoured places.

In some places about Sunningdale all forms of Lawson Cypress luxuriate. In Messrs. Noble's nursery I saw some unique specimens of *C. L. erecta viridis*, and others, perfect trees in every respect and a delight to look upon.

C. macrocarpa and *var. lutea* are both lovely trees in a small state. I have never seen fully grown trees. Both are difficult to move, and neither is of any use for the London area.

Retinosporas.

Unfortunately these beautiful trees are no use within the smoke-fog area. In a few years their beauty is gone; they become bare below, and thin; the wind whistles through them, and they look more like scarecrows than things of beauty.

R. obtusa stands best, and some of the dwarf varieties (*nana* &c.) will endure for a long time; it is not, however, life and growth, but rather death delayed for too long, that we witness.

I do not know if these trees have been planted in gardens outside the

London area, or whether they would thrive anywhere in the Thames Valley.

Cryptomerias.

Very few of these trees appear to exist in the London suburbs. But I know of a few passable specimens (as town-grown trees go). I should not, however, recommend them.

Libocedrus decurrens.

This tree is absolutely unmatched for avenue or specimen purposes, where it will do. Unfortunately this is only in certain soils, and not at all in the London area.

So many of the "Stately Homes of England" have been modelled on Italian lines, and *require* avenues of columnar Cypress to complete the association.

It is therefore very unfortunate that those varieties most used in Italy are not hardy in our climate. Yet in *Libocedrus decurrens* we have an equally suitable and even more beautiful tree, perfectly hardy, and keeping its intense lustrous foliage intact through the severest east winds, and in the very depth of winter.

The best specimens I have seen were growing in a damp gravelly soil (Dogger Sands) overlying Kimeridge Clay. I think they require a damp soil; for at Kew, though they exist and grow, they have lost their beauty to a great extent. This defect was still more marked in a row planted at Isleworth about 1846, and recently cut down. I hope—but this is only a hope—that *Chamæcyparis Fraseri* will fill this great lack of a hardy columnar Cypress for Great Britain in places where *Libocedrus decurrens* will not grow. *Thuya gigantea pyramidalis* may also prove a fine tree for such purposes.

Biotas.

Of recent years these have been subject to the attacks of the "Juniper louse," which in the course of a few years spoils the beauty of the trees. Sudden death has also overtaken two of these trees in my garden. They were about fifty years old, and in fair health until this June, when they suddenly died. Cause unascertained. This is one of the trees which used to flourish about this district, but does so no longer. It should not be planted in suburban gardens.

Junipers.

The Chinese Juniper seems immune from the parasite. There is a yellow garden form, beautiful in a small state. None of these trees are suitable for suburban gardens.

Sequoias.

S. gigantea (*Wellingtonia g.*) does well in places where the Lawson Cypress does well. It is by no means an ideal garden tree, and, unless a very perfect specimen, looks gaunt and out of place in a garden. It is a forest tree. *S. sempervirens* (Red Wood of builders) is another forest

tree quite out of place in a garden. It is a slow grower. Neither of these trees should under any circumstances be planted in suburban gardens.

Araucarias.

No Araucarias should ever be planted in any suburban garden. *A. imbricata* does well as a specimen tree in any district where summer droughts never take place—in Ireland, for instance.

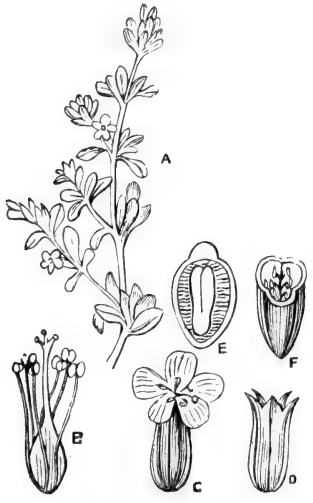
I have a presentable tree in my garden, but it is only kept alive by allowing a hose of running water to play upon its roots the whole summer; and then it is like fighting against nature.

Pines.

Scarcely any can be recommended for suburban gardens. The Bhotan Pine [*P. excelsa*] does better than the rest in the smoke-fog area, and is a very rapid grower; but recently a white aphis (?) has attacked the boughs (appearing on the under side), and another disease the shoots. This is certainly a fine rapid-growing forest tree for dry soils, and should be extensively planted in the New Forest, but it is not a garden tree. It carries seed when comparatively young, and the seedlings are easily reared. *Abies Nordmanniana* is one of the worst trees for the purpose that have ever been introduced into suburban gardens, and should on no account be planted.

Tsuga canadensis (Hemlock Spruce).

By the lake at Kew this elegant erect tree appears to be doing fairly well. If it will stand the smoke and dry soil (which latter is more than doubtful) it would be a good "screen" tree, as it gets up well without taking too much room, and has an elegant contour.



PECULIARITIES OF THE CAPE FLORA.

By Rev. Professor G. Henslow, M.A., V.M.H., &c.

Introductory Observations.—The general *facies* of the flora of a country with a relatively dry soil and atmosphere, as that which prevails in South Africa, and especially the western half, is very observable; and when it is found to be the same in varying degrees in widely separated countries, as in the deserts of North Africa, in the arid districts of India and Thibet, of Afghanistan, in parts of Australia, Brazil, Mexico, &c., so that these several countries afford very similar appearances in their respective floras, one infers (but of course, at first, merely on *a priori* grounds) that most probably similar causes have produced these similar results. A closer inspection shows that the similarities in the vegetative systems of plants, which often have no affinity between them whatever, can be carried down into the minutest details of histological structures. Moreover, a large proportion of such structures at least are always serviceable to the plants in resisting the deteriorating effects of an insufficient supply of water, as well as of an excess of radiation and other hindrances to such vigorous growth as is maintained in moister climates.

We thus begin to suspect, indeed very strongly, that the various peculiarities obtaining are the *direct results* of the dry climatal conditions surrounding the plants, and that the unfavourable environment actually brings about the production of just those kinds of structure which are best able to resist the injurious effects of the climate, and so enables the plant to survive under them.*

The country north of the Cape—omitting the eastern half—is characterised by a very dry climate, the rainfall being under 10 inches per annum; and it is to this great absence of water that the flora is particularly specialised.

With regard to the rainfall in South Africa there is a marked difference between the east and west sides. In the former there are two maxima of 3·5 inches, in February and March, and again in November, the minimum being 1·25 inch in June, such being the average of twenty-two years at Graham's Town.

On the other hand, there is only one maximum, of about 4·5 inches in June, taken at the Observatory, near Cape Town, being the average for forty-two years. The minimum is about half an inch for each month of the summer, viz. December, January, and February.

The mean temperature of January at Cape Town is 70° F., while it rises to 80° F. in the interior, as at Kimberley. In July it is 58° at the former and 62° at the latter.

The first point to remember is that plant life cannot exist without

* Introduction to "The Origin of Plant Structures by Self-adaptation to the Environment exemplified by Desert or Xerophilous Plants," *Journ. Linn. Soc., Botany*, xxx. 1893, p. 218.

water; hence plants must make the best use of it when the rainy season comes.

Secondly, they must so construct the superficial tissues as to secure as little loss as possible by transpiration during the rainless season.

Thirdly, they must, if possible, be able to absorb dew and mist during the months when no rain falls.

Lastly, they must be able to store up water within their tissues whenever it can be obtained.

Roots.—The roots are, of course, the main absorbing organs, and the chief point to notice is that when plants grow in hot sandy districts in which the water can remain at some less or greater distance below the surface, the roots will elongate proportionally, even to the extent of forty feet, as in the case of the Naras plant (*Acanthosicyos horrida*, of the order *Cucurbitaceæ*), which grows near Walfish Bay, on the west coast of Damaraland. Similarly small herbs, as *Monsonia nivea* in North Africa, which produces a little tuft of leaves, may have a root some twenty inches in length. Dr. Aitchison * describes "several species of *Astragalus* which have long whip-like roots the bark of which is employed as twine by the people of Beluchistan."

This elongation of the tap-root is due to the sensitiveness of the growing point to moisture, which induces it to develop in the direction from which watery vapour ascends. Such is often the case in England when the appropriate conditions occur; such induce long roots to be formed in plants growing over a cave which find their way down and hang suspended in the moist air. They may enter a field drain-pipe, as a turnip root in the writer's possession, which grew to upwards of six feet in length.

Roots may also act as a storage of water. In some desert plants in North Africa such has been found to be the case. Thus in the genus *Erodium* there are three desert species which develop tuberous structures in the roots, which proved to be water- and not starch-bearing structures. In some Grasses the cortical tissue of the roots stores it up. The probable cause of the enlargement of the cells in roots is the great heat of the sand, which sometimes amounts to 130° F.; for M. E. Prillieux has shown experimentally how an abnormal excess of heat affected the roots of Beans &c. in a precisely analogous manner by enlarging the cells of the cortex and pith. While, however, in that case the distension of the parenchymatous tissue was, of course, abnormal and pathological, in desert plants it has become a characteristic and an important feature.

Stems.—A common feature of dry desert land is for the woody stems to be gnarled, stunted, twisted, &c., with great disarrangement and malformation of the various internal tissues. This is due to the arrest of development and consequent degradations which are found in the structure of the leaves, upon which that of the stem and roots depends; for the leaves possess a much reduced assimilative power for making wood. Consequently there are often various anomalies in the distribution of the histological elements in stems of desert regions.

Another type, well illustrated in the South African flora, is of a thick,

* *A Summary of the Botanical Features of the Country traversed by the Afghan Delimitation Commission*, 1884.

massive, and fleshy character. This occurs in several distinct families of plants.

This form of stem is particularly characteristic of members of the family *Cactaceæ*, such as of species of the genera *Cactus*, *Cereus*, &c. occurring in the dry rocky regions of Mexico; but only a single plant of this order (*Rhipsalis*) is found in South Africa. Instead of this family certain genera of others *represent* the *Cactaceæ*, as *Euphorbia* (*Euphorbiaceæ*), *Stapelia* (*Asclepiadaceæ*), *Adenium* (*Apocynaceæ*), *Kleinia* (*Compositæ*), &c.

It is instructive to pass through the "Cactus House" (No. V.) in the Kew Gardens; for if a visitor look only at the plants, and not at their labels, he will not know when he has passed the group of Euphorbias and is gazing on members of the *Cactaceæ*.

The fleshy type is by no means confined to the above-named genera, for an ally of our groundsel of the order *Compositæ* is represented by a long and fleshy-stemmed species (*Senecio Johnstonii*), sometimes growing twenty feet in height.

Those massive fleshy stems are well adapted for storing up water. On the exterior there is a dense chlorophyll-palisade zone included within an epidermis with a very thick cuticle. The greater part of the interior is occupied by the cortex, consisting of large thin-walled cells in which an inspissated water is kept. It is often milky, as in Euphorbias, or gummy &c., so that the chance of loss of water by transpiration is much reduced.

Besides these aërial stems, some plants store up water in subterranean stem-structures.

The commonest in South Africa are the bulbs and corms of the numerous monocotyledons which give so remarkable and characteristic a feature to the flora of the Cape. The inner scales, besides being reservoirs of food, also retain water. In the excessively hot deserts of North Africa some bulbs, as of *Allium Crameri*, have the outer scales of a dense, almost woody character, thereby protecting the inner water-holding scales from the intense heat of the sand.

The genus *Oxalis* has a very large number of species at the Cape, one of which, *O. cernua*, was introduced into Malta in 1804. From that time till the present it has spread more or less through the whole length, north and south, of the Mediterranean regions. It possesses a remarkable instrument for storing water. Growing among loose rubble, it sends downwards a long slender rhizome till it becomes almost thread-like. It bears minute bulbs and adventitious roots. At the extreme tip of this thread it suddenly swells into a slender rod, two or three inches in length. This stores up water. It finally bears a bulb at the actual end. No doubt this is supplied with the water for growth, as soon as it germinates after the dry season is over.

In endeavouring to discover the *immediate cause* of the origin of water-storage tissues generally (for we shall find that leaves often possess them) I would suggest that it is primarily due to the accumulation of water within the plant, in consequence of the arrest of transpiration. This latter function is in turn greatly impeded by the formation of a thick and often waxy cuticle, as well as by a dense clothing of

hair. Such is often assisted by secretions of substances (such as tannin, gum, mucilage, resinous matters, salts, &c.) which thicken the water, and so render it less capable of being lost.

Lastly, the thick cuticle and wax are themselves induced to be formed by the great heat and light.

Hence all these features, which thus bring about the very best structures to enable the plants to survive the injurious effects of the climate, are simply the direct outcome of the excessive heat and light, coupled with the deficiency of water.

They illustrate the general responsive power possessed by protoplasm to build up such structures as are required by the plant under whatever circumstances it may find itself. They illustrate what Darwin called "definite results produced by the direct action of the conditions of life."

Leaves.—It is in the leaves where the greatest diversity resides, but in all cases the forms and structures are the result of the external conditions of life.

Commencing with large and broad leaves as occur in members of the order *Proteaceæ*, they are of a leathery or "coriaceous" texture, with a thick cuticle, often waxy, and with the stomata or breathing pores sunk at the bottom of pits or grooves, which are more or less closed by hairs. At least these features are common in many plants with quite differently shaped leaves.

The arrest of cellular tissue between the ribs and veins of the framework forming the so-called skeleton of a leaf causes the leaf to be often deeply lobed or dissected. Thus in the genus *Hakea* (*Proteaceæ*) a commonly cultivated species has a thick, lobed leaf, looking like a double or enlarged tooth-comb. Several members of the *Umbelliferæ* have dissected leaves, apparently from the same cause.

It must be observed, however, that any other cause which arrests growth may produce similar forms. Hence submerged dicotyledonous plants have almost always dissected leaves, as our English Water Crowfoot (*Ranunculus aquatilis*). In this case degeneracy affects the fibro-vascular bundles as well; whereas under drought the tendency is for them to become rigid, and even spinescent. Such, for example, is seen in the "ericoidal" or Heath-like type of foliage.

Besides the true Heaths, of which there are some 500 species at the Cape, many other plants of very different orders assume a similar form of leaf, such as the members of the family *Bruniaceæ*, peculiar to South Africa, *Phylica* (*Rhamnaceæ*), *Gnidia*, &c. (*Thymelaceæ*), and many others.

The advantage accruing is the great reduction of surface to be exposed to the sun. A not uncommon feature is the rolling of the margins *backwards*, so that the stomata are concealed within the tube. In Grasses the two halves of the blade sometimes remain conduplicate when the stomata are on the upper side.

Our English *Empetrum nigrum* has leaves of which Sir J. D. Hooker observes:—"The recurved portion conceals the pubescent under-surface and forming a tube closed at both ends." A still further reduction of the size of the leaf from that of the Heath is obtained by shortening it, when the apex becomes hardened and spinescent. This is well seen in several

plants of quite different orders, as in *Mundtia spinosa* (*Polygaleæ*) and *Aspalathus* (*Leguminosæ*), both being common South African plants.

We reach a further stage in the loss of the spiny tip. The leaf is then reduced to a minute size and is closely adpressed to the shoot. This type may be called *cupressoidal*, as it resembles the form seen in *Cupressus*, *Thuya*, and *Juniperus* of the northern hemisphere.

It is, however, imitated in widely different plants; but to judge by coincidences it is brought about either by a cold or hot atmosphere, provided it be dry; for it is found in arctic and antarctic regions, as well as on Alpine and in hot deserts. It is even seen in our own Ling (*Calluna vulgaris*).

As illustrations from South Africa the following may be mentioned: *Selago*, *Elytropappus*, *Crassula lycopodioides*, and some species of Heaths &c.

Lastly, the leaf may be totally arrested. In this case the stem undertakes all the function of leaves, as in the Euphorbias and Stapelias, already alluded to.

We have seen how fleshiness or succulency occurs in many stems, but it as frequently, if not more so, is found in leaves.

The genus *Mesembryanthemum*, which has some 300 species in South Africa, is the most familiar example there, the leaves assuming various forms, as cylindrical, deltoid, hatchet-shaped, &c.; but in all cases they store up water.

In England that genus is not known except under cultivation; but our Sedums, *Cotyledon* (a large South African genus), and the House Leek are familiar to us as having thick succulent leaves, in correlation to their habit of life, growing on walls, rocks, and roofs of houses &c.

Another type of plant characteristic of Africa is the Aloe (species of *Aloë*, *Liliaceæ*). In Mexico is the so-called American Aloe, familiar to the residents of the Riviera, where it often flowers, bearing huge candelabra-like flower-stems, some twenty or more feet in height. This genus, however, belongs to the order *Amaryllidaceæ*. The two plants very closely resemble each other, having similar long massive leaves terminating in a hard point.

The leaf acts as a storehouse of water; as by far the greater part of the interior consists of large cells filled with water, but charged with a resinous matter which supplies the "bitter Aloes" of druggists.

Spinescence is eminently characteristic of dry places and hot deserts. In the fleshy Euphorbias the leaves are rarely present, being represented by tufts of spines. It is the same with the Mexican *Cactaceæ*.

We have seen how the ericoidal type easily becomes spinescent; thence it passes into the cupressoidal; but it is of common occurrence to find both forms of leaf on the same bush of Juniper &c., the spiny leaf representing the younger, and the non-spinescent the older type. These thus correspond with their evolutionary history.

In some plants the stipules only are spinescent. This is characteristic of the genus *Acacia*, of which *A. horrida* is a well-known shrub in South Africa. It supplies one of the several plants known as the 'Wait-a-bit' thorns, being useful for hedges.

In some plants of the *Compositæ* the spinescence is confined to the scales of the involucre, as in the Calthrop (*Centaurea Calcitrapa*).

In some it is the arrested branch which constitutes a spine, as in our own Furze, but the leaves of this are also spinescent. A common tree in South Africa, called the Kei Apple tree (*Abelia*), is often used for hedges on account of its formidable sharp-pointed branches.

The Epidermis.—As the chief object is to prevent the loss of water by transpiration, it is the surface of the leaf which acquires various peculiarities to secure this result; consequently the epidermis acquires a thick cuticle composed of suberine, *i.e.* of a corky nature. Wax is often secreted on the surface as well as on hairs arising from the epidermis. Silica may also be present; while the stomata are variously protected, either by being sunk in deep pits clothed with hair or with other obstructions, as water-cells, on the surface. Moreover it has been found that they close if the heat be very excessive, whereas in temperate climates they open on a warm sunny day. Again, the surface may be covered with silky hairs, as in the leaves of the 'Silver Tree,' or woolly, as on some of the many 'Everlastings' of the Cape.

In some cases the hairs are "stellate" or consist of "needles" flattened so as to make a felt-like surface, acting as a non-conductor.

In some the epidermal cells act as water-storage, or the hairs themselves may be globular and full of water held in reserve, as is easily seen on the 'Ice-plant' (*Mesembryanthemum crystallinum*).

The hairy covering, while acting as a preventive against loss of water, is also an absorbing instrument during the hot season, when there are excessively heavy dews at night.

That plants can absorb water as rain or dew by their foliage, whether hairy or not, has been satisfactorily proved by Boussingault and others, including myself. The following are a few examples out of many in a series of experiments with dew.

If a leaf is quite turgid it is not likely to absorb any appreciable quantity, so I took some score of detached leaves of different English plants and laid them in the sun for three hours on a September afternoon until they were all more or less flaccid. I then weighed them, placing them on a close-cut lawn after sundown. They were left out all night to a heavy dew until just before sunrise. I then carefully removed all superficial moisture.

Besides their being obviously and completely "freshened up," the gains per cent. in weight was most pronounced.*

Hairy leaves have an advantage over smooth ones, as the hairs can not only absorb better than a thin cuticle, but retain the drops of water for a much longer time than a smooth surface alone can remain wet.

Another means of absorbing dew, according to Dr. Volkens and Dr. E. Sickenberger, occurs in certain desert plants, such as *Tamarix* (and its herbaceous ally *Réaumuria* in North Africa), *Frankenia*, of which South Africa has three species, and *Statice*. They secrete, by the evaporation of water at the surface, chlorides of sodium, calcium, and

* See "On the Absorption of Rain and Dew by the Green Parts of Plants," *Journ. Linn. Soc., Bot.* xvii. 1878, p. 313.

magnesium.* These excessively hygrometric salts absorb dew, which is transmitted to the plant, and thus enable it to retain its bright green colour all through the hot season.

I have already alluded to wax as being frequently secreted on the cuticle and epidermal hairs. This is a strong preventive to the loss of water, which escapes as vapour through the stomata.

It is the presence of wax and the thick coating of hair which obscures the green chlorophyll, to which the blue-grey colour so observable in many South African plants, and still more so in North African deserts, is due.

Wax is particularly present in such South African genera as *Rhus*, *Cotyledon*, *Protea*, *Myrica*. Dr. Marloth thus describes the stems of *Sarcocaulon Burmanni* and *S. Patersonii*, which "will burn even when green, because the outer bark consists of cork well saturated with wax. On the older branches this layer is about one tenth of an inch thick; but if one extracts the wax by repeatedly boiling it in chloroform it swells, becoming ten or fifteen times thicker, and showing ten to thirty annual rings, each consisting of numerous layers of cork-cells. On the plant, however, they are glued together by the wax, and form a solid mantle entirely enveloping the stem."

As a continuous coating of wax would nullify absorption the bases of the hairs of some plants in the northern deserts at least, which are more or less coated with it, are often "slashed," the wax being wanting over parts of the lowermost cells, through which water can pass within.

Conclusion.—The universal features observable in the peculiarities of plants adapted to drought are that they not only occur alike in various members of the vegetable world, in precisely the same manner—as the *Cactaceæ* and *Euphorbiaceæ* so well show—but that they are the actual result of the influence of the external conditions of life upon the plants. These *respond* to those conditions, and have thus acquired all the vegetative features so characteristic of the general *facies* of the so-called "xerophilous" plants. I repeat that it is one of the many illustrations of what Darwin called the "definite action of the environment" under which "new sub-varieties arise without the aid of natural selection." †

* Such was the result of analyses, by the late Dr. E. Sickenberger of Cairo, of the salts in *Réaumuria*.

† *An. and Pl. under Dom.* ii. p. 271.

EXAMINATION IN HORTICULTURE, 1903.

The Annual Examination in the Principles and Practice of Horticulture was held on April 22, 1903, when 198 papers were sent in.

Three hundred marks were allotted as a maximum, and all candidates who obtained 250 marks and upwards were placed in the First Class. The total number was 15, or about 7·6 per cent.

Those who secured 200 marks and less than 250 were placed in the Second Class. The number was 62, or about 31·3 per cent.

Those who obtained 100 marks and upwards to 200 marks were placed in the Third Class. The number was 111, or about 56 per cent.

Ten candidates who obtained less than 100 marks were not placed.

There has been a decrease in the number of candidates, as 229 offered themselves in 1902; and lower percentages in the First and Second Classes, and a correspondingly higher one in the Third.

Two causes may account for these differences. First, the character of the examination was raised, as it was found that the syllabus of the requirements previous to 1902 had become too limited for the more advanced studies now very generally undertaken by the students. Secondly, the relation between the maximum for each class is altered; that for the First Class now eliminating all who fail to obtain 250, instead of 200. Similarly the Second Class now requires a minimum of 200 instead of 150 marks.

These changes fully account for the smaller percentage in the First and Second Classes. Although the standard of the questions, of the Elementary Principles especially, has been varied, it is gratifying to find that, though fewer examinees attained to the First Class, those who did so were quite competent to answer the questions in a very satisfactory manner. In the department of Horticultural Operations the answers on most subjects were fully up to the average of the last three years. The subject which seemed most difficult to the candidates was Landscape Gardening, in which the answers were not satisfactory; indeed most students avoided the subject altogether. The question on Bog Gardens and Aquatic Plants was also left out very frequently, and when the subject was taken up it was not well done. A larger number of candidates than usual failed to answer four questions fully, and in two or three instances this happened with those who answered remarkably well as far as they were able to go. If the candidates had been allowed a little more time they would certainly have stood very much higher on the list.

The questions in both sections are more difficult, and it may be matter for careful consideration whether it might not be better to allow half an hour longer, so that the fastest writer may not on that account have so great

an advantage over one who has perhaps better knowledge of horticulture, but is a less rapid penman.

(Signed) GEORGE HENSLOW.
JAMES DOUGLAS.

First Class.

		No. of Marks gained.
1.	Brenchley, W. E., Swanley College	285
2.	Hunter, A. J., 30 Oxford Avenue, Westoe, South Shields	280
3.	Bidwell, L. S., Lady Warwick Hostel, Reading	275
	Jones, H., Lady Warwick Hostel, Reading	275
5.	Bigg-Wither, L., Swanley College	260
	Millard, M., Lady Warwick Hostel, Reading	260
7.	Badcock, M. C., Lady Warwick Hostel, Reading	255
	Baker, W., Essex County School of Horticulture	255
	Miller, A., University College, Reading	255
	Stone, H., St. Luke's, Hartley, Plymouth	255
11.	Bayne, G. M., Lady Warwick Hostel, Reading	250
	Callender, L. G., 15 Brandenburgh Road, Chiswick	250
	Forder, H., Ruthin Castle Gardens, Ruthin, N. Wales	250
	Gower, W. H., School House, Frensham, Surrey	250
	Pollard, G., Swanley College	250

Second Class.

16.	Bidwell, M. C., Lady Warwick Hostel, Reading	245
	Blencowe, J. T., Eastcott Gardens, Kingston Hill	245
	Douglas, M., Swanley College	245
	Fotheringham, G., Swanley College	245
20.	Bury, F., Swanley College	240
	Hammett, T. H. P., 2 Falkland Road, Barnet	240
22.	Bolton, J. W., School House, Raydon, Hadleigh, Suffolk	235
	Brown, W. R., R.H.S. Gardens, Chiswick, W.	235
	Clear, A., Essex County School of Horticulture	235
	Dicketts, H. R., Essex County School of Horticulture	235
	Smith, I., Swanley College	235
	Swaine, R. H., Swanley College	235
	Wood, W. J. T. P., Ripon House Gardens, Putney Heath, S.W.	235
29.	Hammond, M. R., Swanley College	230
	Ingles, M. G., Essex County School of Horticulture	230
	Robinson, H. S., Swanley College	230
	Tyson, Jas., School House, Ulpha, Broughton-in-Furness	230
33.	Dixon, J. E., Spencer Park Nurseries, Wandsworth Common	225
	Gledson, R., Bigod's Hall, Dunmow, Essex	225
	Hay, J. D., University College, Reading	225
	Hopkins, J. W., Anthorn Board School, Kirkbride, R.S.O.	225
	Joyce, H. J., Fressingfield, Harleston, Norfolk	225
	Weaver, L., West End, Woking	225
39.	Allwork, D., Swanley College	220
	Bennett, E., Swanley College	220

		No. of Marks gained.
39.	Buckland, C., 5 Mersea Cottages, Manor Road, Braintree	220
	Clewley, C. H., County Technical School, Stafford	220
	Cooper, F. M., Wiltshire Cottage, Binfield	220
	Duckers, J. R., 1 Bridgefield Street, Hapton, Burnley	220
	Godfrey, G. B., Chignall Board School, Chelmsford	220
	Jaszowska, A. H., Swanley College	220
	Parry, W., Board School, Penygroes, R.S.O.	220
	Reely, H. A., Brightwell, Wallingford	220
49.	Thomas, G., The Gardens, Coedmore, Cardigan	215
	Hall, J. H., County Technical School, Stafford	215
	Hendley, M., St. Mary's Priory, Wallingford	215
	Marshman, H. A., Seale, Farnham, Surrey	215
	Williams, M., School House, Forest End, Wokingham	215
54.	Baldwin, W., Horticultural School, Holmes Chapel	210
	Birchenough, W. H., Horticultural School, Holmes Chapel	210
	Chappelow, H. D., Ramsden Heath, Billericay, Essex	210
	Phillips, H. J., Middleton-on-the-Wolds, Driffield	210
	Pickering, E., County Technical School, Stafford	210
	Rudd, G. C., School House, Theale, Berks	210
	Rylance, J., Moss Farm Cottage, Roby, Liverpool	210
	Shackleton, E. M., Shotwick Vicarage, Chester	210
	Witham, H. W., 50 Paradise Road, Clapham Road, S.W.	210
63.	Forster, Y. T., Swanley College	205
	Harvey, W., Board School, Cholsey, Wallingford	205
	Hibbert, C., Lady Warwick Hostel, Reading	205
	James, T., Woodcote, Horsley	205
	Millar, J., Balminnoch Lodge, Kirkcowan	205
	Odell, A. E., 9 Gordon Road, Kingston-on-Thames	205
	Thomasset, B. C., Swanley College	205
70.	Griffith, G., Llanddyfnan Board School, Llangefni	200
	Jacob, F. E., Lady Warwick Hostel, Reading.	200
	Lewis, J., Feckenham Schools, nr. Redditch	200
	Mather, M. A., 64 Bridge Street, Bolton	200
	Pickering, I. M., County Technical School, Stafford	200
	Salway, W. H., 33 Stopford Road, St. Heliers, Jersey	200
	Wade, T., Essex County School of Horticulture	200
	Weaving, W., Hilltop, Slaithwaite, Huddersfield	200

Third Class.

78.	Ainsworth, A., Spettisbury, Blandford, Dorset	195
	Aley, T., Theobald Park Gardens, Waltham Cross	195
	Brown, W. P., 22 New Springs, Smith Hills, Bolton	195
	Darbishire, A., Lady Warwick Hostel, Reading	195
	Hulme, H., Horticultural School, Holmes Chapel	195
	Jolley, E., Jubilee Road, Waterloo Ville, Hants	195
	Lee, J., Woolton Wood Gardens, nr. Liverpool	195
	Moore, H. J., 18 Gloucester Road, Kew	195
86.	Ash, G. E., 8 Guildford Park Road, Guildford	190

		No. of Marks gained.
86.	Byford, M., Far Hill School, Stroud	190
	Curtis, J., Ruthin Castle Gardens, Ruthin	190
	Oakes, R., 26 New Street, Chipping Norton	190
	Offer, H., 11 Alexandra Road, Englefield Green	190
	Pilkington, E., 191 Scobell Street, Tottington, Lancs.	190
	Suckling, C., Essex County School of Horticulture	190
	Thorn, F. J., Essex County School of Horticulture	190
	Topps, F., The Dell Gardens, Englefield Green	190
	Whiting, M. M., Swanley College	190
	Wilks, A., County Technical School, Stafford	190
97.	Jones, D. G., Horticultural School, Holmes Chapel	185
	Larnder, A., Swanley College	185
	Mountain, J. T., Sheep Street, Bicester	185
	Walker, T. S., School House, Adderbury	185
	Woodger, B. W., Green Street, Sunbury-on-Thames	185
102.	Creek, E. G., Westerfield House Gardens, Ipswich	180
	Reed, H. T., Cromer Villa, Clifton Road, Kingston-on-Thames	180
	Scott, W. H., The Hermitage, Twyford, Berks	180
	Smale, G. N., University College, Reading	180
	Walkden, C. H., The Gardens, Virginia Water	180
	Wallace, E. C., University College, Reading	180
108.	Cooke, F. V., Horticultural School, Holmes Chapel	175
	Hurst, W. H., Water Works, Wallingford	175
	Johnston, M. D., Lady Warwick Hostel, Reading	175
	Livesay, L., Swanley College	175
	Smith, W. H., 33 Lancaster Street, Barnsley, Yorks	175
113.	Bennitt, W. E., County Technical School, Stafford	170
	Brindley, J., Horticultural School, Holmes Chapel	170
	Charlesworth, E. B. M., Swanley College	170
	Evans, R., County Technical School, Stafford	170
	Judson, H. R., 4 Church Street, Epsom	170
118.	Jackson, T., 21 High Street, Walshaw, nr. Bury	165
	Langton, H., University College, Reading	165
	Parker, R. W., Horticultural School, Holmes Chapel	165
	Perkins, A., Offenbach House, Burbage, Hinckley	165
124.	Robertson, A., Ashburnham Place Gardens, Battle	165
	Wheeler, R. A., Essex County School of Horticulture	165
	Atkins, C., County Technical School, Stafford	160
	Butler, T., 4 Upper Bridge Road, Redhill	160
	Jeffery, F. W., Trentham Gardens, Stoke-on-Trent	160
	Jordan, J., County Technical School, Stafford	160
	Keene, C. E., County Technical School, Stafford	160
	Prewett, W. J., Frensham Place Gardens, Farnham	160
	Robinson, S. A., Essex County School of Horticulture	160
	Tayler, J., Clapham Rectory Gardens, Worthing	160
132.	Edwards, H., 4 King's Buildings, Mount Street, Guildford	155
	Harding, P., Horticultural School, Holmes Chapel	155
	Samuels, A. H., Abbey Gardens, Battle, Sussex	155

		No. of Marks gained.
132.	Sharp, W. S., Burton Hall Gardens, Neston, Cheshire	155
	Simmonds, A. E., Ormond Road, Wantage	155
	Walker, N. H., County Technical School, Stafford	155
	Wright, W. J., School House, Langrish, Petersfield	155
139.	Priaulx, N. W., 15 Smith Street, Guernsey	150
	Robson, H. F., Park Lodge, Queen's Road, Kingston Hill	150
	Tew, T., County Technical School, Stafford	150
142.	English, E. C., South Petherton, Somerset	145
	Martin, T., Woolton Wood, Woolton, Liverpool	145
	Murrell, B. P. J., University College, Reading	145
	Owen, S., Ruthin Castle Gardens, Ruthin	145
	Peto, D. E. E., Chapel House, The Vineyard, Bath	145
147.	Blackshaw, A., Horticultural School, Holmes Chapel	140
	Evans, G., Horticultural School, Holmes Chapel	140
	Goble, W. E., Kingswood Warren Gardens, Epsom	140
	Hazel, E. H. R., Swanley College	140
	Hubbard, H., Nantclwyd, nr. Ruthin, N. Wales	140
	Parry, M., Lady Warwick Hostel, Reading	140
	Rutter, E., Horticultural School, Holmes Chapel	140
154.	Broomfield, W., The Gardens, Pierrepont, Farnham	135
	Coltman, H., Horticultural School, Holmes Chapel	135
	Pickering, C. A., County Technical School, Stafford	135
	Polkinghorne, F. J., Polgwin, Bodmin, Cornwall	135
	Rogers, A. E. T., Shiplake Court Gardens, Henley-on-Thames	135
	Taylor, T., County Technical School, Stafford	135
	Thompson, B., Wallaton, Nottingham	135
	Trollope, T. Middleton Park Gardens, Bicester	135
162.	Dunn, W., Horticultural School, Holmes Chapel	130
162.	Edwards, L. J., Horticultural School, Holmes Chapel	130
	French, N. G., The Larches, Adderbury, Banbury	130
	Reid, G., The Gables, Surbiton, Surrey	130
	Smart, A., Lesmurdie, Elgin, N.B.	130
	Western, H., North Bank, Hextable, Kent	130
168.	Bradford, M. M., Adderbury, Banbury, Oxon	125
	Hitchman, F., Cleveley, Allerton, Liverpool	125
	Pidgeon, F. A., The Limes, Waltham Cross	125
	Powell, G. W., Laleham, Staines	125
	Ramsden, S., 40 Letcombe Street, Reading	125
	Scargill, H., Cantley Hall Gardens, Doncaster	125
	Wain, L., Adderbury West, Banbury, Oxon	125
175.	Hill, W., 8 Canehill Cottages, Purley, Surrey	120
	James, C. E., 14 Croft Road, Wallingford	120
	Molyneux, W., County Technical School, Stafford	120
	Stevens, E. M., Kingscote, Wokingham	120
	Weavers, C., Park Lodge, Binfield, Berks	120
180.	Coward, H. V., 21 Merton Hall Road, Wimbledon	110
	Sibley, J., The Grove, College Road, Dulwich, S.E.	110
182.	Cockburn-Hood, C. C., Swanley College	105

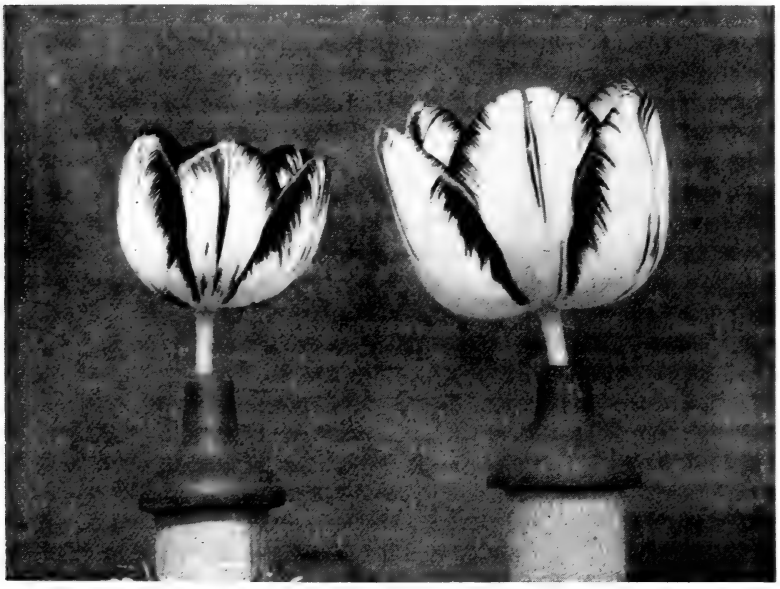
		No. of Marks gained.
182.	Grey, E. C., Theobald Park Gardens, Waltham Cross . .	105
	Race, A., University College, Reading	105
185.	McGregor, W. D., Horticultural School, Holmes Chapel .	100
	Nash, W. J., Belvedere Nursery, Wimbledon . . .	100
	Seymour, L., North Bank, Hextable, Kent	100
	Slade, W. H., Adderbury, Banbury, Oxon	100

FUTURE DEVELOPMENTS OF THE SHOW TULIP.

By James W. Bentley, F.R.H.S.

This subject may be looked at from two points of view, that of the specialist or Tulip amateur and that of the garden lover, and it will be best in my remarks to keep these distinct. Before one speaks of the future development of the flower it will be useful to consider what are its present faults, and in what it falls short of the unattainable standard of perfection in both cases.

The great fault of the Show Tulip from the specialist's point of view is the extreme inconstancy of the position and quantity of the marking



Sir Joseph Paxton Masterpiece

Fig. 31.—Feathered Flowers.

colour. A certain amount of inconstancy is a necessary part of the interest its votaries take in it, for if Tulips could be grown to bloom as reliably as Daffodils, for instance, we should not care very much about them; for the joy of getting them in the condition our souls love would not be so keen as it is now that we have this inconstancy to consider. But it must be admitted that there is rather too much of this joy of uncertainity, and it would encourage the spread of the cult if it could be minimised considerably. As an instance of the magnitude of this drawback I may say that I have seen well-grown collections of over a thousand blooms of good varieties from which it has been impossible to cut twelve specimens to worthily compete for the first prize at the

National Tulip Society's show; and one can imagine how disheartened a beginner is when he gets to know that such is the case. I am quite aware that this fault can be greatly reduced by correct cultivation, but I have seen it in the collections of growers of over twenty-five years' experience. Some varieties are certainly steadier than others, and consequently these varieties are retained in our collections, even if faulty in shape and dingy in colour. We have in our collections exhibition varieties over a hundred years old which are still tolerated in spite of their faults simply because they are fairly steady in their markings. So much for the principal fault of the Show Tulip.

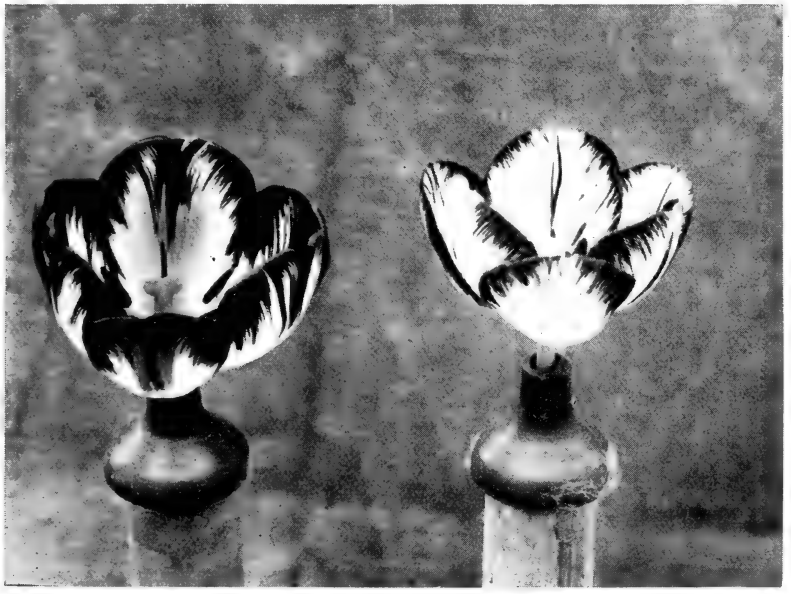
The things to be desired are steadiness in marking, perfectly semi-circular shape, more brilliancy of colour in the scarlet, rose or purple colours, and more darkness in the various shades approaching to black.

Dr. Hardy Lord Stanley

FIG. 32.—FLAMED FLOWERS.

The petals are wanted stouter and wider, the white grounds more brilliantly white and the yellow grounds more golden, especially on the outside of the flowers. We also want flowers that are less liable to damage from the vagaries of our spring weather. This catalogue of wants may seem unattainable, and it certainly is so at present; but there is no doubt that the greater portion may be had in due time. The Tulip, as we all know, is a flower that has been greatly improved by seedling raisers, and I am glad to say that there are even now seedling raisers at work in an intelligent fashion, although it takes from five to seven years before the bulbs bloom. To ensure steadiness of marking we must take seed from the steadiest markers we now have impregnated with pollen from other steady-marking varieties; and for the other desiderata we must only use as parents those varieties which possess stout wide petals and good clear

grounds, and which stand frost and other climatic influences the best. All this necessarily limits our choice for seed and pollen parents, but still there are some varieties left that fairly well fulfil our requirements. For instance, I would cross 'Sir Joseph Paxton' with 'William Lea' to get dark bizarres, and with 'Dr. Hardy,' 'Sulphur,' 'S. Barlow,' 'Lord Stanley,' 'General Grant,' and 'Garibaldi' to get red bizarres. For Bybloemens I would use 'Stockport' crossed with 'Parkinson' or 'Chancellor' for bright purple, and with 'Talisman,' 'Universe,' 'Adonis,' and 'Mrs. Jackson' for dark purples. For Roses—the weakest class of all—I would use 'Tryphena' crossed with 'A. McGregor' and 'Mabel' crossed with 'Mrs. Collier' and also with 'Mrs. Barlow,' and 'A. McGregor' or 'Tryphena' crossed with 'Mrs. Barlow.' By selecting the best of the resulting seedlings and continuing to work on the same lines I feel con-



Garibaldi Lord Stanley

FIG. 33.—FEATHERED FLOWERS.

vinced that in the course of a couple of generations or so much progress could be made. When I talk to flower lovers about raising Tulips and tell them the time it takes before they bloom, the almost invariable reply is, "Oh, I should never have patience to wait so long as that," to which my reply is, "I am not 'waiting,' as they call it, especially for that, but for everything else that makes one's life interesting, and that I am content to wait so long as Providence gives me health and strength to do."

And now I shall briefly state the faults of the flower as an ordinary tenant of the open garden. It is very susceptible of damage from the weather, as rain, hail, frost, or strong winds all injure it. Rain rots the petals, hail cuts and otherwise disfigures them, and hot sun flushes the colour and causes the refined markings to disappear. Frost spoils the

distribution of colour, and in certain states of the growth cripples and disfigures the flowers by causing portions of the petals to remain green. The stems are also in most cases too long and not stout enough, consequently unprotected Tulips have an untidy, straggling appearance. Faults like these cause the florist's Tulip to be in disfavour as a garden flower, and yet there are some varieties which have stout short stems which stand hail, rain, sun, and wind far better than others, and if the flower is wanted as a garden flower these can be selected and improved by judicious crossing. 'Dr. Hardy,' 'Alfred Lloyd,' 'Sir Joseph Paxton,' 'A. McGregor,' 'Colbert,' 'Talisman,' and 'Duchess of Sutherland' are among the best varieties for the open garden. A good way of improvement would be to cross the sturdiest of our varieties with the

George Edward Duchess of Sutherland

FIG. 34.—FLAMED FLOWERS.

purest and most brilliant of the so-called Darwin Tulips, which are mostly sturdy and robust growing. I do not, however, suppose that the florist's Tulip will ever become a general garden favourite, as the early Dutch Tulip has all its wealth of colour, and besides being earlier to bloom is quite as effective in every way. The florist's Tulip will remain, I think, in the hands of comparatively the few, and by them it will be loved and cherished. It has never lacked earnest and painstaking admirers, and it is only to such that it can appeal. We want no Tulip boom, but we do want more flower lovers to grow the flower. The older generation of Tulip men is fast dying out, and one of the objects of the National Tulip Society is to bring the flower to the notice of garden lovers in the hope that more interest may be taken in this most fascinating flower.

FRUIT CULTURE AT THE CAPE.

By Mr. H. E. V. Pickstone.

[A Lecture before the Horticultural Club.]

As you all know, South Africa is a big country, approximately, I suppose, 1,000 miles long by 500 miles broad, and is divided into several colonies, Cape Colony, Rhodesia—which is an extremely large country—Natal, the Transvaal, and the Orange River Colony. Fruit-growing has been carried on from the very first occupation over scattered acres of land in these several colonies, and often at very wide intervals apart. In speaking of "Cape fruit," as it is spoken of in London, it simply means at present fruit grown within 100 miles of Cape Town, or rather in the south-western districts of Cape Colony; and I think it will perhaps be best if I speak more or less about what is now being done in that part of the country, and then say a few words of the possibility of a further extension in South Africa under the new development that recently has set in.

The Cape fruit district is at present confined to a comparatively small section of the country, and there is a climatic reason for this. The south-western districts are the only ones in which the country gets its rainfall in the winter. Those of you who know anything about fruit-growing will understand the importance of a winter rainfall for deciduous fruits, and can realise what we have to contend with in a country where there is a summer rainfall, and at the same time a high temperature and all sorts of pests. Therefore I fancy it is impossible that for some time fruit will be grown otherwise than in small patches, and these will be chiefly confined to the south-western districts.

It may be of interest to know that many of the best varieties of fruits were introduced into Cape Colony over 100 years ago by the Dutch East India Company. To prove their excellence I may mention that it has been recognised by men who have been twelve years out in California, where fruit-growing is carried on extensively, that in South Africa we have some of the best varieties in the world. It is of some interest to follow up the history of these varieties, and in doing so I have felt that the old Dutch Company deserve the utmost credit for the way they studied the interests of their colonial possessions. Unfortunately it became apparent that, owing to the isolated position of the Cape, the possible benefit to the colony from the growing of superior fruit was small; and the result was that deterioration in the quality of the production set in steadily until about twelve years ago. At that time Cape Colony was really in a very bad way, speaking in a general sense; and when the Ministry of the late Mr. Rhodes was in power many thinking people came to the conclusion that every effort should be made to establish any industry which held a possibility of benefiting South Africa. It had been recognised that it was unsound to depend alone upon the gold and

the diamonds, and the result was that some twelve years ago some very small initial consignments of fruit were received in London from South Africa. I do not say that these initial consignments were the products of those gentlemen who had the idea of developing the cultivation of fruit, but I do say that the success of the experiment and the condition in which these fruits arrived led them to think in the direction of fruit-growing.

In the year 1892 the question was brought up in the House of Assembly in Cape Town, and a commission was appointed to take evidence as to the possibility of opening up a fruit trade, and anybody who could give any information on the subject was examined and the whole matter thoroughly gone into. The result was that the Government concluded that there was every prospect of a business being worked up between South Africa and the home country, but that it would be better to leave it to private enterprise; and on that point I think they were quite right. The effect of the appointment of the commission and the notices in the Press of the success, so far, of Cape fruit led to the going out from England of several fruit-growers with the object, if they found suitable locations, of starting fruit-growing; and it also led to several landowners in the colony looking to the planting of trees with the object of opening up this trade. From that time forward for the next five or six years planting was done on a fair scale.

I may give you an idea of the impossibility of starting a commercial orchard in South Africa ten years ago from a personal experience. I was instructed by the late Mr. Rhodes to plant in 1892 on the side of Table Mountain what was at that time the biggest orchard planted in one season in South Africa: it amounted to 370 trees. I had a very good knowledge of varieties, but such was the scarcity of stock that it was impossible for me to plant that orchard without using 120 varieties! For instance, in all the Colony I could not get more than three trees of the Williams' Bon Chrétien Pear! This will show you, as I say, the impossibility at that time of starting fruit-growing on a really commercial scale, and I saw there was only one thing to do, namely, to begin by growing the trees, so as to give all planters a chance of procuring good and sufficient stock, and that of trees of good varieties.

In the rural districts fruit-growing associations were started. It may be worth while mentioning that in these country districts (every district I have mentioned is within sixty miles of Cape Town) the soil was in the hands of the Dutch, and the members of these associations taking an interest in the fruit-growing were almost entirely Dutch. I was a member of four of these associations, and one very seldom heard a word of English spoken. Although our country has been a British possession for 100 years I was the first Englishman to settle on the soil in the Paarl district.

What gave a great impetus to the development of the fruit-growing industry was the visit of Mr. Cillie to California. He is an exceedingly capable man, and he had the confidence of the Dutch, which led to the formation of the associations just mentioned and to the formation of a company for drying fruits, particularly Apricots. In the district of Wellington, which is about forty miles from Cape Town, there were ten

years ago a large number of Apricot trees in scattered orchards—I should think about thirty or forty thousand—and the fruit had such little value that it was used to feed pigs; there was no other outlet for it. One of the causes of improvement was the getting the Dutch farmer to recognise there was something in the grading of the fruit and in the Californian system of drying the Apricots entirely in the sun.

Now to go back a little. As I have told you in 1892 I had the planting of a small orchard for Mr. Rhodes on the side of Table Mountain. From that time up to 1896 I was in close touch with Mr. Rhodes in the matter of fruit-growing. He was a man who took the keenest interest in colonial developments, and particularly in that of the soil, and living as I did with the Dutch and having a knowledge of my business he was always pleased to give me an opportunity of talking over matters with him. In 1895 he assisted me to purchase a farm. After the Jameson Raid he was away for some months settling up the Matabele War, and on his return to Cape Colony he received a great ovation throughout the country from both the Dutch and the English. This is rather a personal matter, but I think I may be excused for relating it. On Mr. Rhodes' arrival in Wellington, which, as I have already mentioned, was the principal fruit district, he was met by a large deputation of farmers, the majority of whom were Dutch, and was taken out to this drying company, which had been established by Mr. Cillie, to look at the drying of Apricots which was going on. I met him up there, and he was very much interested in the whole procedure, and took some time asking all sorts of questions. On leaving he asked me if I had the same confidence in the possibilities of fruit-growing at the Cape as I had always held. On my replying "Yes" he asked me to come down to Cape Town to see him at an early date. I went, and he said, "Look here, you have always believed in this fruit business. You have a farm in Drakenstein Valley. I want to buy the whole valley; how much would it cost?" As it is twenty miles long by ten miles wide, and contains a number of farms and a small village, you will understand that the order was a big one, and I did not know how to take it. I said, however, that I thought it might be bought for a quarter of a million. He simply replied, "Then go and buy it." That is the way that the Rhodes fruit farms were started. I do not mean to say that we bought up the whole of the Drakenstein Valley, because I found that much of the land was unsuitable, but it was the means to the end.

None of you may know, what everybody knows in that part of Africa, that when certain politicians found out that somebody was purchasing land in the south-western provinces on a large scale they immediately did their utmost to prevent it changing hands. However, fortunately, we were able to get possession of some of the best farms—thirty-three in all—which cost about £125,000, and these we still hold. The planting of these farms was not a cut-and-dried thing by any means. There was a great deal to be taken on trust, and experiments had to be made. On one farm, for instance, I had determined to plant 15,000 Pear trees. A man who had been on the farm for forty-five years came over and I consulted him. He told me that the trees would not grow without water. I had to explain to him that fruit could be grown without irrigation by up-to-date

cultivation of the soil; in fact we use no irrigation for the deciduous trees now growing on our farms; but this man told me that it was no good planting at all. Of course they had never tried, but I have my satisfaction now from the prices we are getting in London, and from the wide distribution of fruits.

We had all sorts of difficulties; and I tell you of them because it is as well you should know that it has not been quite plain sailing. To give you another example, we bought farms at Wellington of about 500 acres and planted some 50,000 Apricot and Prune trees over the hills; and in taking these farms over we had to run a great many risks; there were no trees grown under the same conditions in the district. About two years ago we had a terrible wind, and about seventy or eighty acres of these young trees were absolutely destroyed. The wind was so strong that the soil, being of a granitic nature, was taken up, and had actually scored these trees to the pith on the windward side. However we replanted and tried a new system of planting, Oats between the trees; and having no severe winds the next year, the trees came on very well. Last spring however, we had another wind, which was sufficiently strong to blow the crop of Oats, then standing a foot high, clean out of the ground in one piece of thirty acres. This land of course we must now throw up all ideas of planting an orchard on. I mention these things to show some of the difficulties we have had to encounter.

In regard to the fruit industry, we have not been one of those colonies which have been always asking for Government assistance; we have asked for no bonus on export such as Australia has secured. The Government have taken on one or two good experts as advisers—that is all.

It may interest some to know the varieties of fruit we grow at the Cape. Of Apples many varieties most popular in England are unsuited to our conditions. We are very successful with the 'Blenheim Orange,' however, and of the American varieties 'Jonathan' is the best. We find particularly that the Australian varieties suit our climate better than any. In regard to Pears all the leading varieties are successful in our country; and of Peaches the best is the 'Old Freestone,' introduced from France by the Dutch more than 100 years ago. I have also introduced successfully many of the latest Californian varieties of Peaches. In Plums the whole race of Japanese varieties seem to do best with us, as for some reason we are quite unable, with very few exceptions, to successfully grow the ordinary varieties of *Prunus domestica*, which do so well in this country.

In regard to the future of the Cape fruit trade I may say that this season we have had more success than we have ever had before. Everything is better done, and we are giving more attention to the fruits, discarding some of the useless varieties &c. There is still plenty of room for improvement, for instance, in the selection of a succession of varieties. I have studied the matter from the beginning of the season, and am very satisfied with the material we have sent over, and I feel that a good step forward has been taken. So far as the steamship companies are concerned, we pay a good freight, higher in proportion than from any other part of the world; and although we are not making any complaint against the

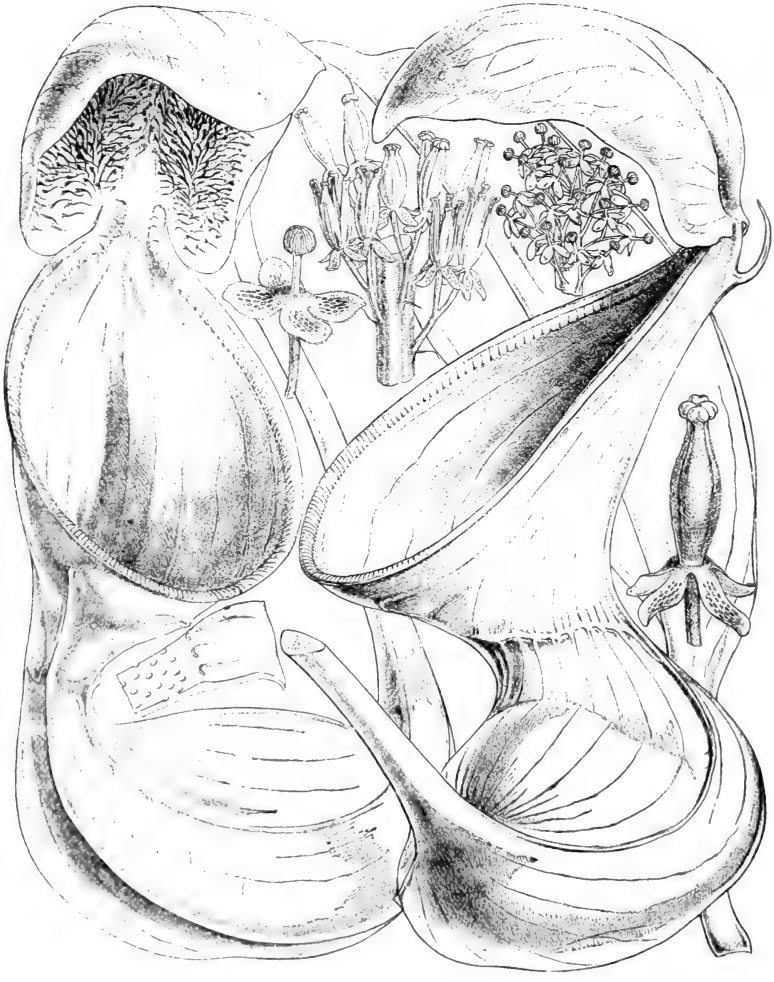
companies what we do ask is that they find increased accommodation to keep pace with the development.

One thing we must keep before us. If the Cape fruit caters for the European trade, it must be in every respect first-class. At dinner this evening I tasted a Peach which was hardly to be known as a Peach by its flavour; but these are things which we feel satisfied we can remedy.

I am told that you would like to know something of the number of the trees in Cape Colony. I hope I have already made it clear to you that the western province is the only part of the colony where we have winter rains, and therefore the only part from which deciduous fruit will be able to be exported; but the extension of the development of the Colonies and the increase of irrigation may, however, alter this later on. However, as to the number of trees in the western provinces. On Mr. Rhodes' farms we have got a quarter of a million, and I should think there are about half a million in outside plantations, and another quarter-million in other scattered orchards, although a great number of these bring in nothing, and the sooner they are destroyed the better. Then in scattered spots about the eastern provinces and the Karoo there is considerable planting being taken in hand by farmers; and it may interest you to know that many of these people are mortgaged to wealthy commercial men in the ports and other business men of more ingenious minds than the owners of the land. I have known instances of these merchants insisting on the farmers planting out a certain number of fruit trees per annum, and I think you will all agree that this is a wise and healthy practice, for the orchards will thus keep on increasing the value of the property both for owner and mortgagor. These orchards in the eastern provinces are not by any means extensive at present; the whole might be covered by 150,000 trees; but still they have only been coming on during the last few years, and I consider the progress so far satisfactory. A great number of Apple trees are being planted there, and seem to be doing fairly well. The majority of these trees have been planted under the summer rains and with no artificial moisture; but whether these rains are of sufficient precipitation to enable the trees to grow and carry their fruit without irrigation I am not sure. This irrigation is one of the great things necessary for the development of our country, and its introduction will increase to an enormous extent the land capable of carrying successful orchards.

Before I conclude I would just mention what I think to be the future of the African fruit trade. Lord Milner and Sir H. Goold-Adams, the Governor of the Orange River Colony, are, as you all know, taking the very keenest interest in the question of the settlement of the land, and they have not overlooked the possible bearing fruit growing may have on the question. Many of you know from your own experience that there is no agricultural interest that will place so many men on the soil to the square mile as fruit growing. The State of California is an example of this; and for reasons such as this the respective Governments are paying the keenest attention to the possibilities of extensive planting of fruit trees. Of course it is quite possible to overdo the thing. In my opinion the indiscriminate planting of fruit trees would be a great danger to the trade. There are certain things, however, which, taking into consideration

the position of South Africa, it will be difficult to overdo—the growing of Apples, for example. They enter largely into everybody's régime, and I think there are certain parts of the Transvaal and the Orange River Colony in which Apples will grow well. With regard to the planting of Oranges, it is being thoroughly investigated by the Government; what may be the results I do not know, but I fear our supplies would clash with those from Europe. For matters such as these I think it would be a most desirable thing, if the Government of the Colonies is going to push the matter of growing fruit, that some sort of commission should be appointed to thoroughly inquire into the markets. This would insure that growers plant only such varieties as there is a demand for at the time of their respective ripening in some part of the world which it has been shown can be reached.



MODERN PROGRESS IN HORTICULTURE.

By F. W. Burbidge, M.A., V.M.H.

[A Paper read before the Horticultural Club.]

"There never was a period when the science of gardening was so universally and so ardently cultivated as it is at present." This statement is as true to-day as it was when Speechly wrote it in the preface of his celebrated treatise on the Grape Vine, published in 1790—over a century ago. We must never forget, however, that individual opinions are apt to be rosy or drab, according to the good or bad position or circumstance in which the individual who expresses them is placed for the time being. Environment influences men's judgment, as it also does many other things.

The highest point to which any art or craft can rise is not altogether expressed by the highest and best results attained by any one gifted individual, or even by a small set of individuals, but rather by the highest average excellence attained by the whole community.

When we try to judge of horticultural progress, we must be clear as to what the main premises really mean. We may also ask if garden progress has risen all along the main trunk or line, or whether some particular branches have not been improved and elevated to a higher standard than others.

Well, on the whole, I think that *upward* progress in all ways, however great, has really been *less* than is generally supposed, and that what many call progress is rather a *wider diffusion* or outspreading of good culture. In a word we have probably a hundred good gardens to-day for every ten good gardens of fifty years ago, this increase being due to improved trade, better education, and other social and economic conditions.

The richest people in England to-day are not all aristocrats and landlords, and many of our best present-day gardens really belong to merchants and others connected with our manufactures and export or import trade.

When we look at the particular branches of horticulture we find that there is nothing stable: everything is in a transition stage as the years go by. Broadly speaking, it is best for horticulture that fashion and tastes, or hobbies, should thus change from time to time. It brings into focus new things, new interests, and affords opportunities for new and able men of all classes.

In the garden there are certain products that nearly all *must* have, such as fruit and vegetables and hardy flowers; and then there are things which middle-class people *may* have, ending at the top of the ladder with horticultural luxuries which only the rich *can afford* to grow or otherwise obtain.

In exotic flower culture especially change has been and is still rife.

Gone are the huge and more or less complete collections from most, if not actually all, large nurseries, because they are no longer popular in private gardens—Ericas, Cape Pelargonia, Ferns, hard-wooded plants from the Cape and Australia, and many other special things.

"Bedding-out" is much modified, and the growth of elephantine exhibition plants has nearly ended to-day. Even the so-called "florist's flowers" *as florist's flowers* are on the wane; so also with hybrid perpetual or "show Roses," so called, and many other once popular things.

Of course these things still exist, and the best of them are often grown far more largely than before, but not for exhibition purposes. In a word, gardening has been, and is, very largely influenced to-day by a deep and healthy and much broader public taste than ever before in our history. Cultivated and artistic people do not like to see show Roses and Chrysanthemums stuck hard and fast into stiff wooden boxes, nor Pansies and Carnations in paper collars to-day.

We can most of us remember how the late John Gibson, of Battersea Park, modified the bedding-out arrangements there by what has since been called sub-tropical gardening. Then we had the still existing change in favour of hardy herbaceous and rock or Alpine flowers.

The Narcissus hobby, again, has occupied attention for years, and still exists, even if perhaps a little less fervently than a year or two ago. The Iris, the Pæony, and the Viola have had and retain popularity, just as did the Auricula, the herbaceous Phlox, the Hollyhock, the Anemone, the Ranunculus, the Pansy, and the florist's Tulip before them. We had hardy wild gardening as an improvement on half-hardy sub-tropical bedding, and now many are practically expressing a taste for flowering trees and shrubs, for bamboos; indeed, the bamboo garden, or "bamboosery," the pergola, the water-garden for choice coloured Water Lilies and other aquatics, and the moraine bed or border seem present-day rivals of the pinetum and the wire temple rosaries of other days. We have had a Sweet Pea and a Dahlia revival, and now that Daffodils, excepting the best of course, are on the wane, we are to have the Garden Tulip as a coming flower.

Plants of to-day must be decorative or both beautiful and useful *selections*, and not merely formal or curious *collections*, and, as often happened in the past, both difficult and expensive to cultivate. Owners of gardens to-day do not emulate the botanical gardens, as did those at Woburn, Chatsworth, or Knowsley in days agone; and for this very reason our botanic gardens, with their full collections, hold an interest for us now that they scarcely ever held since the early history of botanical gardening began.

Selections useful and beautiful *versus* collections curious and rare are the order of the day. Very few country gentlemen now ever think of planting a "pinetum," as so many did fifty or more years ago; and still the best of conifers are sold in much larger numbers to-day than ever before. This eclectic taste is true of other things. As a matter of fact we have to-day better and more catholic tastes at work, and *the many* have now acquired the taste for planting and gardening formerly confined to *the few*. Even the poorest cottagers and allotment labourers to-day may possess a bit of garden if they care to do so.

Amongst the most potent factors of change and progress in nursery management, so far as imported Orchids, bulbs, &c. are concerned, have been the public or auction sales held in London, Liverpool, Manchester, Birmingham, and other large towns. The expenses and risks of collecting abroad and the lowering of prices consequent on competition both at home and on the Continent, as combined with the effects of auction sales, have revolutionised the nursery trade formerly done in these exotics and other plants.

The price of all nursery stock is lowered sooner or later by auction sales; but in the case of trees and shrubs, hardy plants, and Dutch flower roots the effects are not so apparent, as the widespread public demand is so enormous. In the case of Orchids, however, for which the demand is comparatively limited, the effects were more immediately seen. As a consequence Orchid collecting has been left in the hands of those who import expressly for sales by auction, and one result has been that those who can pay for glasshouses and fuel, and afford the necessary attention and labour, may grow Orchids if they care to do so. An enormous influx of new and beautiful home-raised seedlings and hybrid Orchids is another result that has been encouraged by auction sales. In other words new Orchids are now being raised by the thousand under glass roofs beneath an English sky. In this way the nurseryman can protect himself and his creations.

Good and beautiful as is the best of professional gardening in private places and nursery gardens, I think I may safely say that the greatest *upward* horticultural progress has been made of late years in market gardens, and especially those in which large areas are covered with glass, and having all the modern "resources of civilisation" in the shape of appliances for hastening, retarding, or otherwise growing and utilising fruits, vegetables, and decorative plants and flowers.

These glass-roofed market nurseries exist near all our large towns, and they extend from the Land's End to John o' Groats. I never look over one of these extensive glass-roofed gardens—like Rochford's at Old Turnford—without saying to myself that the demands of Covent Garden and other large markets have led to some of the most remarkable phases of horticultural perfection, both practical and economic, ever seen in British horticulture.

We all know the dictum of Adam Smith, who in writing his celebrated "Wealth of Nations" in 1776 said market gardening was a poor calling, because nearly all persons able to purchase garden produce were also able to grow their own supplies.

This was probably quite true at the time, but the growth of large towns and manufactures, the increase of population, &c. have altered things, and to-day, not only is there a good open market for edible garden produce grown in England, but for imported fruit, vegetables, and flowers to the annual value of many millions of pounds as well.

To grow all our own cereals, meat, and milk products, and even our own poultry, eggs, and honey, may be impossible—I do not say it really is so, but we certainly ought to be able to grow a far larger proportion of fresh fruit, vegetables, and flowers than we now do.

High and able as is the cultivation in our best of private gardens

throughout Great Britain and Ireland, it is to the market gardeners that we shall have to look for the greatest success in British horticultural practice and methods. The reasons are many, but the main point is that gardening is in most private places a matter of taste: the personal equation of the owners comes in largely, likes and dislikes being many and varied.

Many private gardens having both grounds and glasshouses well arranged may be economically managed, but there is often a good deal of sentiment connected with them, and they are often badly arranged and are kept up just as horses and hounds, or yachts and motor-cars, and other luxuries are kept up, viz. for personal rather than for economic reasons.

With the trade or market gardener cultivation is purely an economical question, and he arranges things so as to save labour, and he produces, not what he likes best himself, but that which sells best, or the things he can grow at least cost and sell for most money.

One of the most potent aids to progress in horticulture is travel. We must all go to gardens, nurseries, or exhibitions both at home and especially abroad to obtain new ideas and methods and to see what our competitors are doing. The decorative plant cultures of Bruges, Ghent, Brussels, the bulbs at Leiden or Haarlem, the shrubs and trees at Boskcop, are only a few of the object lessons in commercial gardening our own growers ought to see for themselves. Even so it seems to be still a case of demand exceeding supplies, or an excess of population over the present cultivation and produce of the land.

As things are at present there seems ample room for progress in the shape of more good market gardening, despite the fact that other countries may possess natural advantages, such as a better climate, State aid and instruction, cheaper land and labour; and last, but not least, better co-operative information bureaus and cheaper transit charges as well.

English market gardeners are often too exclusive and independent: they fight shy of co-operation as a rule, and so they are practically at the mercy of the big carriers, whether by rail or otherwise.

One very patent sign of progress nowadays consists in the specialisation going on, especially in trade or market gardening. Some, indeed many, of our best cultivators are specialists in the best sense of the word. It is easier and cheaper to grow a house full of one thing than a house full of many things. One man becomes famous for Grapes or Peaches, and another for Rhubarb and Seakale, or Asparagus, or even Mushrooms; another grower takes up Carnations or Roses, Palms, or Ferns; and we have even specialists devoted to Lily of the Valley who can supply flowers of it practically every day in the year. We have Tomato, Potato, Sweet Pea, and Daffodil specialists, and these men are bound to surpass growers who divide their capital and attention amongst too many separate things. The word specialist spells progress. The planting of groups or masses of one good plant, or shrub, or tree, instead of the old method of dotting about single plants of almost everything, is one of the most radical and far-reaching of all modern methods in gardens.

In fruit-growing the same principle is going on, and instead of an orchard of fifty or 100 trees, all different, we have perhaps ten to 500 trees

of a kind, and only the best and most useful or profitable kinds or sorts are grown. The mixed-muddle orchard or fruit-garden has gone the way of the mixed-muddle shrubbery and plant-houses, and so far there certainly have been progress and improvement also during recent years.

There have been revivals, too, in the garden ; sun-dials and quaint old urns of lead or stone are being introduced to many brand-new gardens—"old wine in new bottles"—and not always of good taste or right proportion. Instead of the old moats for protection, and fish or stew ponds for food on fast days, we have Water-lily pools or tanks and canals, and we have borrowed the old gazebo or pergola from Italy, not for our Grape vines, but for Honeysuckle, Clematis, and rambling or climbing Roses.

Hedges of clipped Holly, Box, Yew, or Cypress are being again used for shelter in place of walls, and I may add that Levens and Elvaston must look to their Laurels or other old formal trees, for there is a marked revival in the shape of corkscrew-twisted and poodle-clipped evergreens.

Even in garden literature there is progress, thanks in the main to photography and process blocks—and may I add competition ?—since we now have a baker's dozen of weekly (and "weakly") gardening newspapers where we formerly had only two or three. There are, or are to be, revivals in our craft literature also. For some years all the nice old gardening monthly magazines with coloured plates (if we except the "Botanical Magazine") have been dead and almost forgotten, but a revival has taken place in the shape of "Flora and Sylva" which Mr. W. Robinson has recently taken in hand.

I may be allowed to say that with all our many horticultural papers there appears to me room for at least one more. None of us can read everything of interest now published in the numerous papers and books devoted to gardening in all its many phases, and I think there is ample room or scope for a weekly digest and index of all they contain. Such a paper, or let us say horticultural register, well done and of a convenient size for binding would be a great boon to us all.

Just a word about the gardeners of the future, the young men or journeymen of to-day. I hope they will see and note the signs of the times, and get a sound training in the cultivation of hardy plants, alpines, aquatics, flowering or evergreen shrubs and trees. Never were good kitchen gardeners and fruit and vegetable growers more in request than they are to-day. Our present-day young gardeners and probationers have a strange yearning to be "under glass," and so they often obtain an unequal or one-sided training. These men often fail when they obtain all-round situations where outdoor gardening is thought to be as important as or even more so than that in the glasshouses. Of the many young men I have had through my hands I have usually found the outdoor students more successful when they left me and went to other places than were those who preferred to potter about under a glass roof. Young men now-a-days have advantages quite out of the reach of men who started twenty or thirty years ago. There are books and illustrated papers, lectures, classes, and technical schools or institutes in all large towns and in many of the villages throughout the country. Knowledge is in these days obtainable by all, and knowledge is not only power, but profit and pleasure as well.

Most good employers and their gardeners afford facilities for self-instruction to their men, and this is best done, as I believe, without any coddling or over-persuasion. It is not so much what you give as what you enable a man to earn or win for himself—it is not what is taught, but what men are led to learn for themselves—that does them and the nation at large the most good. Above all, young men should be told and shown early in their career that it is not mere knowledge as knowledge, but the practical application of good lessons well learned, that is really serviceable in the world's progress. The great thing for young gardeners to do is to learn the principles of horticultural science or the basal rules of the craft first, as they may do readily in Macmillan's primers on horticulture, geology, botany, logic, political economy, and chemistry.

Drawing to scale and a moderate ability in freehand sketching are one of the best aids a gardener can possess in his calling. A rude pencil or pen diagram with measurements added in figures is better than either verbal or written description, and will save time, trouble, misapprehension, and labour in many ways.

Finally, young gardeners must learn all the constants or set rules of garden craft, even though as master gardeners they may modify or even now and then break them.

New methods are few only, but of great economic importance. Chief amongst them perhaps is the "retarding" process, or freezing apparatus, by which many hardy shrubs, plants, bulbs, vegetables, and flowers may be held inanimate for months and then brought to perfection at will. In this way we get Lilac and Lilies and other things any day in the year, or just when we require them. The use of ether, again, assists materially in the process of forcing or acceleration, and the electric light may on emergency be pressed into our service to the same end.

These scientific resources of civilisation have already worked wonders as practically applied by trade growers, and it would appear that time and season will be done away with, and it will be possible to have many choice garden products in the market and on our tables any or every day in the year. We must look also for new legislation on the important question of diseases (fungoid or otherwise), insects, and weeds in gardens and fields alike. Sir James Rankin, M.P., has already a Bill in the House of Commons, which has passed the first reading, "with a view to the eradication of disease and insects from amongst fruit trees &c. in nursery gardens." This will mean some quarantine regulations and inspection of imported stocks, seeds, &c., and may lead to a pathological section being added to the existing machinery of the Department of Agriculture; in a word, it is becoming as serious to harbour diseased or insect-infected plants as it is to keep diseased animals.

In considering horticultural progress the Royal Horticultural Society may be taken as an index, or let us say as a barometer, showing the high pressure and popularity of gardening in England. We need scarcely ask whether garden craft is spreading when the fellowships of our premier Society are increasing by a thousand or more year by year.

Then the Royal Botanic Society is also progressing and doing good work, though perhaps along slightly different lines. To put the difference of method, one may say that the R.H.S. teaches gardening as associated

with botany, while the R.B.S. teaches botany as associated with gardening. It is tweedledum *v.* tweedledee, and the result is a loss of force and to some extent a needless competition, and it is a matter of regret that the two Societies cannot co-operate for the public good. Local societies we must have, and very useful work is done by them ; but even these are all the more useful if federated with the central authority and prestige of the R.H.S. of England.

On all sides we see evidence of combination and co-operation in the farming world and in other forms of productive and distributing commerce, but gardeners as a body hold aloof from organised association, as some of us think, to their own loss both individually and collectively.

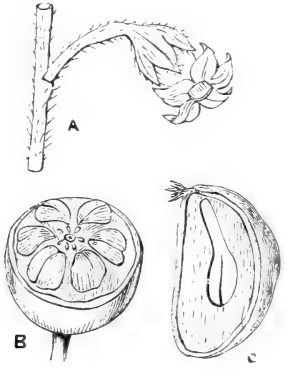
All craftsmen and industrial workers must organise "for defence, *not* defiance" now-a-days, and gentlemen's gardeners as isolated units scattered all over the length and breadth of Great Britain and Ireland are like sheep without a shepherd, and their isolation renders them defenceless against imposition of many kinds. If it be true that "union is strength" it must often follow that isolation and weakness are often, even if not always, synonymous terms.

A well-organised national union or guild of British gardeners would do more than any other thing I know to encourage the progress and improvement of gardening in the British Islands.

To sum up, then, my present argument is this, that method and skill in the best private gardens are up to a very high state of excellence, but that the most economical production and the largest and best crops—I do not say of the best varieties in all cases—are to-day produced in our concentrated trade or market gardens.

I also may suggest that no finer produce is grown in private gardens now than was grown fifty years ago, either in the shape of fruit, vegetables, or flowers, despite the influx of new and improved varieties. The old records now beaten are but few.

I am no politician or prophet; I merely note the signs of the times ; and I hope I have shown, or at least suggested, that gardening, formerly aristocratic, conservative, and secretive, is now democratic, more generally diffused, and more liberal, and that as an art or craft it is open to peer and peasant alike ; open to "all sorts and conditions of men," open as is the sunshine or the light of day.



ON A METHOD FOR RENDERING CUCUMBER AND TOMATO PLANTS IMMUNE AGAINST FUNGUS PARASITES.

By George Massee, V.M.H.

The amount of forcing in the way of high temperature, excess of moisture, and constant application of fertilisers considered necessary to secure a fair margin of profit, when Cucumbers and Tomatos are grown in a wholesale manner under glass, renders plants thus treated highly susceptible to disease.

There are two principal reasons for this susceptibility: (1) "soft" foliage; (2) the presence of fungi and eelworms in the soil.

It is a well-known fact that, in the case of plants growing in the open air, infection by fungus spores occurs almost entirely during the night, when the vital activity of the foliage is somewhat checked, due to retarded transpiration and respiration. Under these circumstances there is an accumulation of those substances favouring infection present in the leaves. This is what constitutes "soft" foliage. During the day the vital activity of the leaves is unimpeded, and the various substances formed are quickly conveyed away to other parts of the plant; hence the facility for inoculation by fungus spores does not exist. This is the condition expressed by the term "hard" foliage.

In the case of plants growing under glass as described above, the conditions are practically always highly favourable for the production of "soft" foliage; hence their extreme susceptibility to infection from fungus spores. This condition of things explains the rapidity with which an epidemic spreads when it once gains a foothold; whereas plants of the same kind grown out of doors, or even under glass, under more normal conditions remain free from disease.

Under the exceptional conditions of cultivation described above, not only do the well-known parasites of the Tomato (*Cladosporium fulvum*, Cooke, and *Fusarium lycopersici*, Sacc.) and of the Cucumber (*Cercospora melonis*, Cooke) flourish luxuriantly, but certain other fungi, normally occurring only on decaying vegetable substances in the open, now and again assume a parasitic existence, when accidentally introduced into houses where the conditions are so favourable to their development.

The case of *Dendryphium comosum*, Wallr., may be given as an illustration. This minute fungus is not uncommon in Britain and other countries. It grows on decaying plants, which it frequently covers with a dense dull olive-coloured mould.

During the present season a market-gardener, whose Cucumbers suffered severely from leaf-blotch (*Cercospora melonis*, Cooke) last year, brought a number of diseased Cucumber plants to Kew for examination.

The general aspect of the plants suggested a recurrence of the epidemic of the previous season; but microscopic examination and repeated cultures and inoculations showed the blotches on the leaves to

be caused by *Dendryphium comosum*, Wallr. Further investigation showed the fragments of manure projecting from the soil in which the plants were growing to be covered with a copious development of *Dendryphium*, and the fungus was finally traced to the manure-heap.

Previous to the present record *Dendryphium* has never been known to act as a destructive parasite; and its becoming so in the present instance is entirely due to its accidental introduction, along with the manure, to a set of conditions which enabled it to assume a parasitic existence on plants predisposed to disease. Experiments conducted at Kew prove conclusively that *Dendryphium* cannot attack Cucumber plants growing in a cool frame. It may be added that the *Dendryphium* has not only spread throughout the house where it originated, but has also attacked Cucumbers in two other nurseries owned by the same gardener, the spores having been carried by clothing, tools, &c. from one place to another.

No records of the occurrence of this newly created parasite are as yet to hand from other localities than those enumerated, but now that its parasitism is established it is likely to extend its area of devastation.

The use of fungicides in the form of sprays has not by any means produced the results desired and anticipated, and extended experiments have demonstrated that, under the conditions necessary for the rapid production of Cucumbers, the daily syringing and constantly damp surface of the foliage render useless those fungicides which, when applied under more favourable conditions, have proved effective.

Under the circumstances a series of experiments have been carried out with the object of ascertaining whether some substance taken up by the roots of Cucumbers and Tomatos would not render plants thus treated immune against the attacks of fungus parasites, without at the same time exercising any injurious or retarding effect on growth or on the production of fruit.

From among the various substances tested, sulphate of copper ($CuSO_4$) alone met all the above-mentioned requirements.

The following is an outline of the mode of treatment of plants rendered immune by the use of sulphate of copper.

The Cucumber and Tomato seed was sown, and the plants grown throughout in a stove, having a mean temperature of 75° F., the humidity varying between 79° and saturation point. The potting, watering, spraying, and general treatment were left entirely to a gardener, and consequently was conducted along the lines followed in establishments where the fruit is grown for sale.

The Cucumbers were of the varieties known as 'Telegraph' and 'Every Day,' and the Tomatos 'Up to Date' and 'Main Crop.' Three hundred Cucumber seedlings and an equal number of Tomato seedlings were subjected to experiment, fifty of each kind being used as check plants. When the seedlings were a fortnight old, the Cucumbers were grouped round eight large Cucumber plants badly attacked by *Cercospora melonis*, Cke., and *Dendryphium comosum*, Wallr., and the Tomato seedlings were arranged around a Tomato plant bearing numerous blotches on the leaves caused by *Cladosporium fulvum*, Cke. At this period the specific course of treatment commenced, which consisted in watering the

plants every third day with a solution consisting of one part of sulphate of copper in seven thousand parts of water. The check plants, which were not watered with the copper solution, were indiscriminately mixed with the treated plants. The watering was done during the afternoon, and the quantity used for each plant was sufficient to soak the soil thoroughly.

After a month's treatment all the Tomato plants were perfectly free from disease. On the other hand, one or both cotyledons of thirty-four Cucumber plants showed blotches of the disease. At the same time a considerable number of the untreated check plants, both Cucumbers and Tomatos, were badly diseased.

At this stage both treated plants and checks were sprayed with water containing the spores causing their respective diseases, and this was continued weekly until the end of the experiments. Under this drastic treatment all the untreated check plants, both Cucumbers and Tomatos, were badly diseased during the following two weeks.

After six weeks' treatment with the solution of sulphate of copper of the strength indicated above, the strength was increased to one part of sulphate of copper in six thousands parts of water, and the soil in which the plants were growing was soaked every fourth day until the end of the experiments, which lasted for eleven weeks. At the expiration of this period both Cucumber and Tomato plants were bearing a good crop of well-grown mature fruit.

Not a single one of the Tomato plants treated with the sulphate of copper solution showed a trace of disease; and in the case of the treated Cucumber plants the disease never extended beyond the cotyledons, and this notwithstanding the fact that badly diseased plants were growing amongst the treated plants throughout the entire period. In addition to this the treated plants were sprayed several times with water containing spores of the fungus parasites in suspension. It now simply remained to ascertain whether any of the copper taken up by the roots of the plants had been deposited in the fruit. For this purpose specimens of Tomatos and Cucumbers borne by treated plants were submitted to Dr. Thorpe, C.B., F.R.S., Principal Chemist, Government Laboratory, who reported as follows:

"I have examined the samples of Tomato and Cucumber produced from the plants treated with solutions of copper sulphate sent to me on the 4th instant, but there is no evidence that the amounts of copper present are sensibly greater than are found in the fruits obtained from the untreated plants.—(Signed) T. E. Thorpe."

It is important to bear in mind the fact that the above method of treatment for producing immunity against fungus parasites applies to Cucumbers and Tomatos only, so far as direct experiments have been carried out. A solution of sulphate of copper appears to have markedly different effects on different kinds of plants. *Luffa ægyptiaca*, Mill., a close ally of the Cucumber, is killed by two waterings at a strength of one in six thousand. Barley, on the other hand, remains perfectly healthy when treated with one in five hundred, and in addition may become badly attacked by its common parasite, *Oidium graminis*, P.

The proof that the solution of sulphate of copper is actually absorbed by plants is well shown in the garden Nasturtium, *Tropæolum major*, L., where the effect of too strong a solution is first indicated by a bleaching of the tissue surrounding the water-stomata, situated at the margin of the leaf. When Grasses are similarly treated, the tip of the leaf, where the water-stoma or its equivalent crack in the epidermis is present, is the first part to bleach and die.

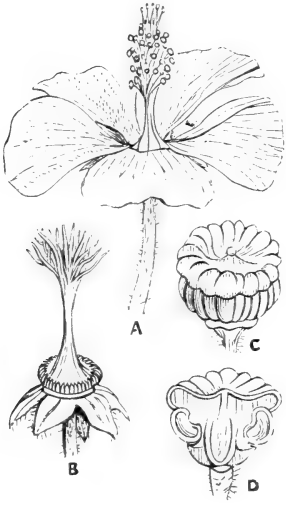
In what particular way sulphate of copper is capable of rendering certain plants immune against parasitic fungi is not definitely known, neither is this the place to discuss in detail this phase of the subject. It is certainly not due to the solution present in the leaves killing the germ-tubes of the spores on their entry through stomata, because spores of all three species of parasites alluded to in this paper germinate readily in a solution of one in seven thousand of this substance. The probability is that the copper arrests or modifies the production of some substance in the leaves, which favours the entry of the fungus into the plant.

Danger arising from the presence of fungi or eelworms in the soil can be guarded against by sterilising the soil yearly with gas-lime. It is equally important to treat in this manner fresh soil, about to be placed in the houses, as that already there.

Practical Directions for Treatment.

Commence watering Cucumbers and Tomatos, when a fortnight old, every third day with a solution consisting of one ounce of sulphate of copper dissolved in 50 gallons of water. After treating for six weeks as above commence watering every fourth day with a solution containing one ounce of sulphate of copper in 35 gallons of water.

The sulphate of copper should be pure, and rain-water should be used if possible.



HORTICULTURE IN NEW ZEALAND.

By G. Hunt, F.R.H.S.

It occurred to me on the voyage home from New Zealand that it might be of interest if I put together some few facts regarding New Zealand flowers and plants, so that the Fellows of the old Society might be interested in knowing what the colonists are doing in regard to horticultural and agricultural matters. And I have to thank the President and Council of the Royal Horticultural Society for the opportunity now given me, and for the exceedingly hearty welcome accorded to me personally by many of the Fellows, for which I thank them, not only as a kind compliment to myself, but also to the colony of New Zealand, to which I am proud to belong.

Horticulture in New Zealand, considering the short time that the colony has been established, has made rapid strides, not only in the large centres, but also in the smaller settlements, and it is the more remarkable when one remembers that the people in the country districts lead a busy and laborious life. In the pastoral districts breaking down the bush, reclaiming the wilderness, and bringing the land into cultivation occupy the settler and leave him but little time to think of the growth of flowers; but in the towns, where the hours of labour are so much shorter than in the Mother Country, many enthusiasts are found who devote their energies to the perfection of their particular favourites.

The Rose has many admirers, and it is surprising how soon all the new varieties that are produced in England and on the Continent find their way to the colony farthest south.

The Chrysanthemum is also largely cultivated and brought to great perfection. The flowers are equal to any exhibited in the Motherland, and as the Chrysanthemum, like the Rose, bears the sea voyage well, new varieties are quickly distributed. Possibly owing to the exacting attention required by 'Mums,' the interest in their growth seems to be diminishing in some of the centres, but in the case of the ever-favourite Rose, which requires less time and attention, I think that it leads the way in popular estimation.

Many soft-wooded plants would be imported, but the risks on board steamer are too great to admit of much success, so that the colonists rely upon seeds to obtain this class of flower. Zonal Pelargoniums do not travel well; black rot soon makes its appearance when the plants are confined on shipboard; but notwithstanding this drawback, many of the new varieties have weathered the voyage and been successfully introduced into the gardens of the colony. The common varieties of this flower were taken out by the early settlers, and now grow wild in the suburban hedgerows, forming high fences, and bloom gorgeously in the summer season; only in the South Island are the plants cut down by the frost. Many other common English flowers live outdoors throughout the winter (except in the southern portion of the South Island). Such

flowers as Nasturtium and Heliotrope live through the winter in the North Island and in portions of the South Island, flowers which are killed by the earliest frost in England.

Much has been done by the various city councils towards providing parks and gardens; but as so much has to be done in developing new districts, funds are not available to enable the work of beautifying the towns to be carried out as in London, Liverpool, and the large towns of the United Kingdom. In the case of the capital city of New Zealand—Wellington—there is a fine reserve for the Botanical Garden, where are preserved specimens of the native and imported trees. Pleasant walks have been formed, and during the last few years borders have been made and bright-coloured flowers planted after the style found in the London parks. The climate of Wellington does not lend itself generously to the horticulturist; the violent winds, which at times undo all the patient work of months, are very discouraging.

In Christchurch, situated in the South Island, we have a far more genial climate, and in addition a deep rich loamy soil, formed from reclaimed swamp land and capable of growing anything. For ages it had grown flax, niggerheads, and other plants peculiar to swamps, and now contains deep deposits of health-giving plant life. Here you will find English flowers and trees growing to an abnormal size: that which is looked upon as a shrub in England grows almost to a tree on the Canterbury Plains. The Common Thorn used for hedges in England develops quickly into a fair-sized tree. Every English plant, in fact, seems to take on a new existence, giant-like in comparison to the parent plant in the old country. In Christchurch much is being done towards beautifying the town, the river-banks having been lately levelled and rounded off; sub-tropical plants, Narcissi and other bulbous flowers, have been freely planted. The public gardens, too, are well looked after, and contain avenues of native and European trees. In Dunedin and Auckland similar public gardens exist, or domains, as they are called in the colony. The Auckland climate being of a more tropical and humid character, all English flowers blossom to perfection.

Viticulture has been taken up by a large number of settlers, principally in the Auckland district; and it has been found that land of poor quality produces most excellent crops of grapes, so also does the land that has previously been turned over in search of Kauri gum, which had been looked upon as not worth the attention of the cultivator of the soil. Professor Kirk, of the N.Z. Biological Department, gives the result of an experiment at the Government Experimental Station, Wairangi. It was very poor land, and a few acres were planted. Out of three acres of Vines the Department had obtained in one year 800 gallons of wine. This was the first vintage. The quantity was very large when it was remembered that in addition to testing the localities they were testing the varieties, and the yield was reduced by some of the varieties which were not heavy bearers. The land and the work on it had not cost the Department £100 an acre, so that £300 represented more than the cost from every point of view of those three acres. There were 800 gallons of wine in the cellar, and if that was valued at 5*s*. a gallon they would get two thirds of the total cost out of the first vintage. In Australia the

men with a small acreage sell the Grapes to larger growers who make the wine, but the co-operative principle is considered to be the only way to make the industry a success, and it is hoped that the N.Z. Government will come forward and help the settlers in establishing on a firm basis an industry which would be of lasting benefit to the colony.

Next in order I shall mention the *Phormium tenax*, or Hemp. The preparation of Hemp for the English and American markets has become a staple industry. The best is produced in the Auckland Province. The plant grows wild throughout the colony, but the product deteriorates in quality in the southern or colder parts. It has not been found necessary to cultivate the plant, sufficient being found in a wild state to keep all the present mills going in full work; but as the business appears now to be established on a firm basis, it is a question for consideration whether it is not advisable to plant large areas of the best varieties on the waste lands of the colony. At the same time prices have so fluctuated that to embark upon a systematic growth of the plant might be considered risky; but it is open for the Government to make trials at the experimental farms of the best varieties obtainable. The N.Z. Government have done much in encouraging the Hemp industry, insisting that it should be graded before shipment by the grader appointed for that purpose, and this action has put the business on a sound basis. The prices at which it is sold in London depend largely on Manila Hemp, which is a superior article; but it is doubtful if any large increase in the shipment from the Philippines is to be expected.

It would need a long chapter to give a description of the various fruits, English and otherwise, that can be successfully grown in New Zealand. I shall mention first the Apple. Unfortunately the codlin moth has made great havoc in some districts; and although experimental shipments of fruit have been made to the old country, it will be some years before the colony will be in the position of the neighbouring country of Tasmania and be able to make such large shipments, abundant evidence of which I have seen in the fruit-shops of every town in the west of England and in London. New Zealand's opportunity will come some day, but it will be necessary for the Government to insist upon radical measures being taken to eradicate the various blights and pests. The very best varieties of Apples have been introduced, and every encouragement given by the Department as regards lectures dealing with blights and pests, and the specified remedies for the same; but until legislation is passed making spraying compulsory, as is done in some of the States of America, New Zealand will not be able to export Apples in any great quantity. The climate is most suitable, capable of producing the finest fruit, but until the pests that I have mentioned are dealt with systematically the growers must be content with a local market, the prices ruling being variable and not very encouraging. Cider is made in the Canterbury Province, and has met with a ready sale, but cider is not consumed in the country districts as it is in the farmhouses in the Mother Country, tea being substituted. Tea is being drunk all day long during harvesting. A little wholesome cider would be better.

Strawberries are grown very successfully throughout New Zealand, the

Auckland district especially producing very fine fruit—good crops with good prices. A small basket containing about 1½ lb. fetches 2*s.* 6*d.* in the retail shops at the commencement of the season, falling to 1*s.* 6*d.* and sometimes 1*s.* 4*d.* towards the latter end. These are good prices compared with those in England, and should pay handsomely. Of course one has to consider the increased price of labour in the colony, and Strawberries, as is well known, require much hard detail work in order to grow to perfection ; but for a man with a wife and family of an industrious bent of character (the very class of people the colony is so badly in need of) Strawberry-growing may be made a profitable avocation. There is a steady demand, and a glut in the market need not he feared.

Raspberry-growing is another industry to which I would like to call your attention. In all parts of the South Island this fruit can be grown to perfection, and in the North Island also ; but in the warmer climate of the north the plant makes too much wood, and in the far north the sun scorches and dries up the fruit. In the Nelson Province, in the northern portion of the South Island, the Raspberry particularly flourishes, a very large acreage having been planted in the Motueka district. There are upwards of 150 plantations, the largest being 25 acres. The 'Red Antwerp' is the variety mostly favoured, and it is considered the standard of excellence. Several American varieties have been tried, but have not met with favour. The 'Red Antwerp' is prolific and reliable, and a profitable variety to grow. A market is found in the capital city of Wellington and in the small townships on the west coast and at Nelson. About 35 miles from Motueka there is an extensive jam factory which will take all the surplus fruit at a fixed price. Raspberries sell in Wellington at 5*d.* a pound in buckets containing about 16 lb., but there is at times a glut, when lower prices have to be accepted; and as the fruit is so liable to perish a quick sale has to be effected. Last year in the district I have mentioned the crop was so abundant that I am informed that 1*d.* a lb. was all that the Nelson factory would give in the height of the picking season. I heard of a grower who, on the road to Nelson with a cartload of Raspberries, hearing that 1*d.* a lb. was all that he would receive at the end of his journey tipped the entire load into the river rather than accept such an unpaying figure. I am glad to say that the Government, through the Agricultural Department, have come to the rescue, and have been instrumental in getting the fruit placed on the London market in a pulp state, and from latest accounts it is likely to prove a success. A pulp factory which was capable of dealing with 150 tons the first season has been erected at Motueka, and an idea regarding the output from the district may be gathered when I tell you that on one occasion during the past season upwards of eighty horse conveyances of various sizes, each loaded with Raspberries, were seen, standing in two rows, near the Motueka wharf awaiting delivery. The pickers receive ½*d.* a lb. Care is taken that the fruit should be packed in good condition, and the pickers are scrupulously clean in everything pertaining to the work. The pulp is put up in various sized tins, from 2½ lb. upwards, suited to the wants of every household.

It should be a satisfaction to our English cousins to know that they are now, or will in the near future be, in a position to obtain the very best unadulterated real British jam from New Zealand, and the help they will

give to the colonies through the satisfaction of their everyday wants will tend in a small way to support and encourage the colonists and keep the money within the Empire.

Large quantities of every description of fruit are produced in the Teviot District, Otago, and find a ready sale in the large city of Dunedin. In Canterbury, where the soil is of a rich deep loamy nature, and where nearly every householder possesses a fair-sized garden, Apples thrive in abundance, and in many cases are allowed to rot on the ground, owing to the want of a market. I have seen in Canterbury the finest varieties of Apples neglected in this way, the cost of labour, the carriage, and the handling charges being prohibitive, the prices ruling not warranting the outlay by the growers.

Regarding exports of a purely agricultural and horticultural character, it may be of interest to state the quantities exported during the year 1901 :

Seeds (Grass and Clover)	294,347 bushels
Potatos	22,834 tons
Oatmeal	3,323 „
Hops	4,298 cwt.
Barley	119,779 bushels
Beans and Peas	166,184 „
Maize	124,447 „
Malt	141,324 „
Oats	10,514,924 „
Wheat	2,301,092 „
Flour	1,305 tons
Chaff	28 „
Bran and Sharps	4,754 „
Fungus	5,902 cwt.
Gum (Kauri)	7,541 tons
Timber (sawn and hewn)	71,822,369 feet *
Linseed	1,140 centals
Phormium (N.Z. Hemp)	10,171 tons
Tow	342 „
Fresh Fruit	24,468 lb.
Onions	35,195 cwt.

It may also be of interest to give a few figures regarding holdings and stock :

Auckland District	15,994 holdings
Otago	13,833 „
Wellington	10,537 „
Taranaki	4,389 „
Hawke's Bay	3,153 „
Nelson	3,102 „
Marlborough	1,438 „
Westland	683 „

* The usual method of measuring timber in New Zealand is by "superficial feet of one inch thick." Such a superficial foot is 12 in. long by 12 in. wide by 1 in. thick, or, in other words, a square foot 1 inch thick.

Live Stock Totals 1901–2.

Horses	279,672
Asses and Mules	406
Cattle	1,361,784
Sheep	20,233,099
Pigs	224,024

Average and Actual Yield of Principal Corn Crops, 1902.

Wheat.

163,462 acres yielding 4,046,589 bushels, an average of 24·76 an acre.

Oats.

405,924 acres yielding 15,045,233 bushels, an average of 37·06 an acre.

Barley.

26,514 acres yielding 855,993 bushels, an average of 32·28 an acre.

Maize.

12,503 acres yielding 571,834 bushels, an average of 45·77 an acre.

Rye.

1,090 acres yielding 27,250 bushels, averaging 25 bushels an acre.

I would like to bring under your notice what a field there is in New Zealand for people with a small capital of their own, and who are desirous of acquiring a small freehold where they would be free from the cares of expensive living and the keeping up of appearances as in the old country. I am aware that the seemingly long distance, and to some the dreaded sea journey, deter many from entertaining the idea, but as regards the journey no such fear need exist. Large and comfortable steamers now leave direct for the colony every fortnight, replete with every comfort. One objection that I have heard, especially among the gentler sex, is that they fear a long bout of sea-sickness, but I can assure them that, apart from a slight indisposition at first amongst those who are prone to the complaint, modern science represented in the huge present-day steamer has practically abolished *mal de mer*. Parents of large families with a taste for horticulture and fruit-growing will find every facility given them for indulging in the growing of their favourite plants, whilst their sons can either take up land on their own account or find, if more congenial to them, employment in the large towns. But I may here say that what New Zealand wants is strong, hardy young men for country life, who will help break down and bring the bush into cultivation, thereby adding to the wealth and general good of the community; and it should be a source of satisfaction to them that they will remain under the grand old flag of the Motherland. A hearty British welcome awaits the new settler. He will find the colonists as one man united in their

desire to uphold the honour and glory of Old England, and if called upon New Zealand, I am sure, will again offer thousands of her sons in helping to defend the Empire.*

I shall here give the wages ruling in the different spheres of work in connection with agriculture and horticulture.

AVERAGE RATES OF WAGES IN EACH PROVINCIAL DISTRICT OF NEW ZEALAND DURING THE YEAR 1901.

Description of Labour.	Auckland.	Taranaki.	Hawke's Bay.	Wellington.	Marlborough	Nelson.	Westland (Goldfield).	Canterbury.	Otago (Part Goldfield).
Farm-labourers :									
With board, per week .	20/	15/ to 25/	20/ to 22/6	20/ to 30/	20/ to 25/	20/	20/ to 30/	15/ to 20/	15/ to 25/
Without board, per day .	6/8	8/	6/ to 7/	7/	—	6/	—	5/	5/ to 6/
Ploughmen :									
With board, per week .	20/	15/ to 25/	20/ to 25/	20/ to 30/	20/ to 30/	20/	—	20/ to 25/	20/ to 25/
Without board, per day .	6/8	8/ to 9/	—	—	—	6/	—	6/	6/
Harvesters :									
With board, per week .	25/ to 30/	—	—	45/ to 50/	—	40/	—	35/ to 50/	25/ to 40/
Without board, per day .	8/4	1/ per hour	1/ per hour	8/	7/ to 8/	10/	—	8/ to 10/	7/ to 8/
Men-cooks on farms :									
With board, per week .	20/ to 25/	25/	20/ to 25/	20/ to 30/	20/	20/	—	20/ to 25/	20/ to 30/
Female farm-servants :									
With board, per week .	8/ to 15/	8/ to 15/	12/6 to 15/	10/ to 15/	8/ to 10/	10/	—	9/ to 11/	12/6 to 20/
Gardeners' wages :									
With board, per week .	15/ to 20/	20/ to27/6	20/ to 25/	20/ to 50/	25/	25/	20/	22/6to25/	20/ to 30/
Without board, per day .	5/ to 7/	7/ to 8/	8/	7/	—	7/	—	5/	5/ to 8/

I shall also add a few particulars regarding the various systems under which land may be taken up, extracted from the "New Zealand Official Guide."

The Crown lands of New Zealand are administered under the Land Act, 1892, together with its amendments and the regulations made thereunder.

The distinguishing features of the present land system are the outcome of ideas which have been gradually coming to maturity for some years past in this colony. These features involve the principle of State ownership of the soil, with perpetual tenancy to the occupier. This, whatever may be the difference in detail, is the prevailing characteristic of the several systems under which land may now be selected. In New Zealand this tendency to State ownership has taken a more pronounced form than in any of the Australian States. In point of fact, most of the Crown lands are now disposed of for 999 years. The rentals are based on the assessed value of the land at the time of disposal, without increase or recurring valuations. Under this system there is a fixity of tenure practically equal to freehold, and which, like freehold, necessarily carries with it the power of sale, sub-lease, mortgage, or disposition by will. At the same time the improvements made in the soil by cultivation

* I might mention here that during my sojourn in England I have heard remarks that the New Zealand Government do not encourage emigration to the colony, but I may say that the only discouragement given is to the landing of paupers, aliens, and imbeciles. The Government have taken up the position that the colony is not to be made the dumping-ground of the pauper element from other countries; but to those who are willing to work, even if their only capital consists of a strong right arm, New Zealand offers a hearty welcome, and every information and encouragement is given by the Government officers in Wellington, enabling employment to be found and land suitable for settlement to be had.

&c. are secured to the tenant should he from any cause be obliged to forfeit or surrender his lease.

The advantages of this system to the selector are manifest. When it is taken into consideration that, with few exceptions, the Crown lands are, in their prairie condition, incapable of profitable use, the advantage to the settler of setting free his capital to develop the capabilities of the soil, rather than having to expend it in the purchase of a freehold, is very apparent. One of the most striking benefits of this system is the advantage it gives to the man who, with little more capital than his strong right arm, is enabled to make a home for himself, which under the freehold system he would be unable to accomplish.

The values placed on the Crown lands are, as a rule, low, for the State does not so much seek to raise a revenue directly therefrom as to encourage the occupation of the lands by the people: this occupation indirectly secures an increased revenue, besides the other advantages resulting from a numerous rural population.

Again, underlying the whole of the New Zealand land system is a further application of the principle of "the land for the people"—viz. the restriction in area which any man may hold. This subject has been forced upon the attention of the Legislature by defects in former systems under which one individual with means at his command could appropriate large areas, to the exclusion of his less wealthy fellow-settler. Under existing conditions, where the price at which land is offered is fixed for ever, and where choice of selection is by ballot, every would-be settler has the same chance, and may hold under the Crown an equal area of land. The quantity that a selector may hold is so fixed as to encourage the class of moderate farmers, for up to the statutory limit the amount he may select is left almost entirely to himself. The Act defines the amount of land anyone may hold at 640 acres of first-class or 2,000 acres of second-class land. These limits apply to lands which are thrown open for optional selection; but in some cases, where the quality of the land is very good and the selectors many, the limit is by regulation made smaller.

In addition to the many advantages offered by the lease-in-perpetuity system, the Land Act provides others, to meet the wants of different classes. The general rule is that land thrown open for optional selection is offered to the public under three different tenures, the choice of which is left to the would-be settler.

The three tenures are:—

(1) Cash, in which one fifth of the purchase-money is paid down at once, and the remainder within thirty days. The final title is not given until certain improvements have been made on the land.

(2) Lease with a purchasing clause, at a 5-per-cent. rental on the value of the land; the lease being for twenty-five years, with the right to purchase at the original upset price at any time after the first ten years and within twenty-five years, or to convert into a lease in perpetuity (3rd tenure).

(3) Lease in perpetuity, at a rental of 4 per cent. on the capital value.

There is another question which has been largely dwelt upon in late

years, and that is the subject of reciprocity in trade matters between England and her colonies. The Right Hon. Mr. Seddon, our Premier, has given the subject marked attention, and we may confidently look forward to the day when a basis of agreement will be arrived at that will be of benefit to British trade as well as to that of the colonies. In my opinion there is nothing that will tend more to bind mutual interests than an arrangement of that nature. If England will help her children —and the initiative must come from her—she will find a response which will be for the good of all. Why should foreign countries swamp the English markets with goods that can be produced equally well by the Englishman's children and cousins across the seas, who abide by the Motherland and are willing to support her in time of need? We can send you butter superior to any that is produced in Denmark or Russia; wines and brandies as good as those sent from Continental countries; wool, tallow, and other products too numerous to mention, which might be placed in a more favourable position than similar articles imported from countries which may at any time be in direct antagonism to the British nation.*

There are many other industries carried on in New Zealand that I should like to dwell upon, but my object when I started writing this paper—written on the voyage home—was to treat of the progress of horticulture in New Zealand; and if I have introduced topics more of an agricultural character you will, I am sure, agree with me that the two are of equal interest, and so bound up with each other that it is somewhat difficult when dealing with their establishment in a new country to treat them separately.

I shall now turn to a subject perhaps more interesting from a flower-grower's point of view, viz. that of the New Zealand flora.

You will not find the country carpeted with wild flowers like Australia, or as in the country lanes of Old England, but there are a very large number of flowering plants in Maoriland which used to be sought for in the bush and forests, more than 950 species of which have been classified. It has been said, because some flowers are not brilliant in colour, that they have no particular beauty, and lack the attractiveness which is so common in others. New Zealand possesses many flowers of this character which from a popular view might not be considered interesting. Of these I might mention the 'Nikau Palm,' a beautiful and graceful tree, and the several varieties of Clematis that twine round the forest trees. More brilliant is the 'Pohutakawa,' which at Christmas-time makes the landscape a brilliant scarlet picture, and which is an exception, as regards colouring, to the majority of New Zealand plants. The colonists use the Pohutakawa flowers for decoration at Christmas-time. Sprays are used to decorate the churches and dwellings at Christmastide, and the plum pudding is likewise garnished with it instead of the loved old-country favourite the Holly-bush. There is also a white climbing variety named 'Aka' or 'Akakura.'

* I should here mention that these remarks were not penned since the controversy at present raging in England was started. The paper I am reading was written on the voyage home in April last to help wile away the tedious hours of the journey, and when the subject of reciprocity in regard to our trade relations at times formed the topic of discussion on board.

Of Myrtles there are several varieties.

1. *Myrtus bullata*, native name the 'Rama Rama,' an erect shrub or small tree, 10–15 ft. high. Flower pale pink; berry long, turgid, black.

2. *Myrtus Ralphii*, a smaller variety.

3. *Myrtus obcordata*, the native 'Rohutu.' Leaves small, pale green, and variegated along the margin. Fruit oblong, $\frac{1}{4}$ in. long, black or violet.

4. *Myrtus pedunculata*, a straggling shrub, 10–12 ft. high, white-flowered, with berries orange yellow in colour. The berries were formerly eaten by the Maoris. There is also found another example of the Myrtle family, viz. the *Pimenta officinalis* syn. *Eugenia Pimenta*, the Maori 'Tawhake,' which yields the "Allspice" of commerce.

Ranunculus.—Of this genus there are several species, found growing luxuriantly in the northern and southern mountain ranges lining the shady banks of mountain streams, the principal among which is the *Ranunculus Lyallii*—'The Shepherd's or Mountain Lily'; flowers waxy-white, 4 inches in diameter, named after Professor Lyall, F.L.S., a botanist of distinction. Another species bears the native name of 'Kori-Kori,' and is found in the North Island and also in the Nelson district, in the high mountain ranges. It is known to the settlers as the 'Big Buttercup,' and is probably the largest buttercup found in the world. Colour golden; $1\frac{1}{2}$ inch diameter.

There are also:

Ranunculus Traversii, cream-coloured; *R. pinguis*, small flower, gold-coloured; *R. nivicola*, found near the perpetual snow on Mount Egmont; colour bright yellow.

Magnolia.—There are one or two varieties of this shrub or tree. The best is *Drimys axillaris*, native name 'Horopito,' known to the colonists as the 'Pepper Tree,' on account of its highly pungent properties. The trunk is 6 or 8 inches in diameter. The wood, pale in colour, is used for inlaying cabinet work.

Cruciferæ.— The cruciform family of plants is represented by:

(1) *Nasturtium*, flowers yellow; (2) *Barbarea*, flowers yellow; (3) *Sisymbrium*, white or yellow flowers; (4) *Cardamine*, white flowers; also *Braya*, *Lepidium*, and *Notothlaspi*, all white flowers.

Viola.— This genus in New Zealand consists of three species:

Viola filicaulis, flowers very pale blue; $\frac{1}{4}$–$\frac{2}{3}$ inch in diameter.

Viola Lyallii, a similar plant, but flowers smaller.

Viola Cunninghamii, pale blue, scentless; $\frac{1}{2}$–$\frac{2}{3}$ inch in diameter.

Melicytus.—Honey Trees, of which there are four species:

(1) *Melicytus ramiflorus*. Height about 30 feet; the trunk about 2 feet in diameter; flowers of a greenish-yellow hue, borne in a mass. The berries are about the size of a Pea, bright violet colour.

(2) *M. macrophyllus*. Four to seven feet high; flowers twice the size of *ramiflorus*, and larger berries.

(3) *M. lanceolatus*. Small slender tree; flowers small, and the berry oblong, $\frac{1}{6}$ of an inch in diameter.

(4) *M. micranthus*. A small variety, with a berry as small as Mustard seed.

Pittosporeæ.—Pitchy seed family of plants, so called on account of the pitchy matter enveloping the seeds.

Pittosporum tenuifolium.—Called by the natives 'Kowhiwhi'; flowers $\frac{1}{4}$–$\frac{3}{5}$ inch long; petals dark purple. The wood is white and adapted for turnery. It is no good for firewood, bearing the local name of 'Bucket-of-water Wood.' The plant makes a good garden shrub. Another species is the thick-leaved *Pittosporum*, locally called 'Karo.' Flowers deep purple in colour. It has been introduced successfully into many gardens. The tree attains the height of 30–40 feet. The wood is white, but worthless where durability is required; used for turnery. Yet another species, the *Pittosporum eugenioides*, locally called the 'Tarata,' makes a pretty shrub, the flowers being borne in masses of pale golden flowers, which have a great attraction for bees from the large quantity of honey secreted in the flowers. Also the 'Piripiri,' a small slender shrub, with flowers of a dingy crimson colour.

Caryophylleæ.—The Carnation and Chickweed family, of which various genera are found, also of the Purslane family, the *Portulaceæ*, amongst which is the *Hectorella*, named after Sir James Hector, F.G.S. It is a small, densely tufted, moss-like plant; flowers white. Also there is another member of this order found in rocky places at an altitude of 5,000 feet; the flowers are pure white, borne in circles at the end of the branches.

The Mallow family is represented by three species:

1. *Plagianthus.*—Shrubs or small trees with very tough inner bark.
2. *Hoheria.*—Small trees with pellucid dotted foliage.
3. *Hibiscus.*—Erect herbs, with often lobed leaves.

I shall briefly mention the *Plagianthus Lyallii*. Native name 'Hohere,' known to the settlers as the 'Wild Cherry.' It blossoms in March, bearing masses of delicate white flowers, named after Professor Lyall. There is also the *Hoheria populnea*, the Poplar-like *Hoheria*, height 10–20 feet, confined exclusively to New Zealand. The bark is peculiar, being composed of layer upon layer of laced fibre, and owing to this it is called the 'Thousand Jacket,' 'Lace-bark' or 'Ribbon-wood.'

Hibiscus Trionum.—This is the only species of this genus found in New Zealand; pale primrose-coloured flowers, with a purple patch at the bottom of each lobe.

Lime Tree.—Of these I shall mention two varieties. The arborescent *Entelea*, or, as the Maoris call it, the 'Whau.' The tree is 10–12 feet in height. Flowers white, capsule the size of a Hazel nut. Spines nearly an inch long. The foliage is greedily eaten by cattle and it is highly nutrious. There is also the *Aristotelia racemosa*, locally the 'Mako Mako' tree, 20 feet high, also known in some districts as the Wineberry. The berries are about the size of the garden Currant. The plant improves under cultivation and is eaten by cattle. I might also mention another example of the order *Tiliaceæ*, namely, *Elæocarpus dentatus*, the tooth-leaved variety, Maori name 'Hinau' or 'Whinau,' bearing racemes of many white pendulous flowers, half-inch in diameter. In olden times a native who was the proprietor of a grove of 'Hinau' trees was a man of importance, since the berries afforded a rich harvest of food, and it was considered a capital offence to rob a grove of these trees.

Of the *Linum* family—the Flax plant—there is one variety, the 'Rauhuia' or 'Kaho,' which grows everywhere in the colony. It bears

flowers of various hues and colours, has been introduced into England, and has been very much improved under cultivation.

New Zealand produces many varieties of the Geranium family of plants, amongst which are the 'Matuakumara,' the Cut-leaved Geranium. There are four species peculiar to New Zealand, bearing pink flowers, often measuring $\frac{3}{4}$ inch across. Another variety is the *Pelargonium australe*, Maori name 'Kopata.' The flowers are pink, small, but many together.

There are also several varieties of *Oxalis corniculata*.

Another beautiful tree is the *Dysoxylum*, or, as the natives call it, 'Kohekohe,' found in the North Island only, and attaining the height of 40 or 50 feet, blossoming in June, when the long drooping bunches of pale-coloured flowers, measuring from 8 to 13 inches, are very attractive. The flowers contain a large quantity of honey, which is eagerly sought after by the 'Tui,' one of New Zealand's beautiful birds, which from giving forth a sweet note of bell-like sound, and possessing two long white feathers at the throat, goes by the name of the 'Parson Bird.'

There are several members of the Buckthorn family. *Pomaderris elliptica*, native name 'Kumarahou,' has handsome and variegated foliage, mixed with old-gold coloured blossoms.

Of the *Sapindaceæ* there are two genera, the *Dodonæa* and *Alectryon*. The best of the former is the 'Ake Ake,' a small tree sometimes attaining the height of 30 feet. The 'Ake Ake' blossoms in September and bears small unisexual (or on some plants both male and female) flowers. The wood is used by the natives for the manufacture of clubs and other warlike instruments, or rather I should say *was* used. It is very hard and of lasting endurance. The Maoris term it sometimes 'Ake Ake Ake,' meaning 'For ever and ever.' The *Alectryon* is represented by the 'Titoki' or 'Titongi,' attaining the height of 50 or 60 feet. The timber is of fine grain, great toughness, and adapted for the purposes of the machinist and shipwright. It bears large panicles of small dark crimson flowers, followed by luscious-looking crimson berries, which the native children eat with relish.

Another beautiful tree, and to the natives a useful one, is the 'Karaka,' which bears a tempting-looking golden fruit about the size of a Plum and shaped like an egg. The Maoris relish it as a staple article of food. The 'Karaka' could be cultivated in the southern parts of England.

One of the most beautiful flowers native to New Zealand is the Crimson *Clianthus*—the 'Kowhai-ngutu,' 'Kaka,' or 'Parrot's Bill'—a branching shrub, flowers scarlet. There is also a yellow variety. The plant varies in size from a small shrub to a tree from thirty to forty feet high, its masses of pendulous golden and crimson flowers making a striking picture on the landscape.

The Saxifrage family is well represented in New Zealand in many different forms herbs, shrubs, and trees. One of the most beautiful is the native Lilac, also the 'Tawari,' the latter blossoming in the warmer latitudes, with long lanceolate leaves and large white flowers. It would prove a beautiful addition to the sub-tropical garden.

There are also many varieties of the Stonecrop family of plants.

Also the *Drosera* or Sundew section is represented by many species. Various experiments have been made to test the digestive powers of these

plants. Mr. G. M. Thompson, F.L.S., of Otago, New Zealand, in an able paper on the "Fertilisation of Flowering Plants" contributed to the "Transactions and Proceedings of the New Zealand Institute," says: "I experimented on various leaves by supplying them with small fragments of raw meat and insects. I did not weigh the portions of meat, as I was not particular as to the exact results, but selected them of various sizes, from the size of a pin's head to pieces as large as a full-sized grain of wheat. In each case the meat was seized by the tentacles in from two to twenty-four hours, those nearest tending towards it, and by the latter time the colour was generally bleached out of it. The process of absorption lasted from four days to as many as eight for the larger pieces, the meat all the time having a pearly white appearance, and being bathed in clear liquid, which sometimes accumulated to such an extent as to run down the blade and petiole. In experiments with insects I placed four full-sized aphides on each leaf, usually not a trace of them remaining; only those glands in the immediate vicinity of the insects appeared to be concerned in the process. These results were obtained in strong healthy leaves; very young leaves seemed sickened by an overdose of meat, while older ones sometimes did not begin to act for two or three days. The digestive powers of the *Drosera* appear similar to those of the human being, and, like ourselves, they suffer sometimes from dyspepsia when treated to indigestible food.

A well-known plant, the 'Manuka,' or Tea Tree, is found covering thousands of acres of the poor lands of the colony; a bush-like plant flowering freely all the year round; a flower somewhat like the English Hawthorn—mostly white—but others are found of a pinker shade.

This paper will not be complete without a description of the 'Rata,' of somewhat similar appearance to the 'Pohutahawa.' The 'Rata' blossoms in January, and the hillsides in the northern districts seem all ablaze with the showy crimson flowers. It often grows to a height of 50 or 60 feet. The plant commences as a climber, creeping in rope-like stems up the trunks of forest trees, which it gradually squeezes to death.

It may not be out of place here to mention a curiosity in vegetable or animal life—call it what you will. It is a caterpillar at one time and like a fungus at another. Captain Hutton says that when in the caterpillar stage it goes down into the earth with the intention of turning into a chrysalis. There a fungus, taking possession of it, fills its body in every part, from the head to the claws, with vegetable matter, and the insect, though maintaining its original shape, is now a plant. When the fungus has completed its task of eating up the caterpillar, it sends a stalk up out of the ground. On this there are spore-cases. Above the ground the fungus looks like a small Bulrush, with a small bulb-shaped point, and it is conjectured that this gives off spores which are devoured by the caterpillars, and in turn the spore germinates in the body of the insect, and converts the animal body into that of a plant.

There are many other varieties of flowers, many of the most beautiful character, which I should like to touch upon did time permit. I should be pleased to put any Fellow in the way to acquire seeds or plants of New Zealand native flowers, the majority of which may be grown in the sub-tropical garden and a large number could be planted in the open. I

would refer any friends who need a fuller description to the "Handbook of the New Zealand Flora" and to that beautiful illustrated work by Mr. and Mrs. E. H. Featon, entitled "The Art Album of New Zealand Flora," published by Messrs. Trübner & Co., Charing Cross Road, to which work I am personally indebted for some of the details concerning plant life in the colony. It is regrettable that this work was not carried beyond the first volume. I think that the New Zealand Government might well be asked to assist in having such a beautiful and useful work brought to completion.

I am grateful to the Council of the Royal Horticultural Society for the opportunity given me to bring under your notice some of the characteristics of horticulture in my adopted land. As I have said before, the study of flowers excites the keenest interest, and I would make a suggestion to the Council, viz. that in the contemplated new garden plants belonging to each British colony should, as far as possible, be grown in separate sections, and so give a representative Empire-like character to the exhibits. As the tendency in these days is to draw the Colonies to the Motherland in a political sense, so in other ways than politics a community of interests on various subjects might be found beneficial to Englishmen and Colonials alike. An opportunity would thus be given, by exchanges and otherwise, to study the plant life of the various countries, and a cosmopolitan character would be added to the new institution.

I should like to add that a movement is on foot in New Zealand towards federating the different horticultural societies into a national society which would have charge of a colonial garden, which "would be a standing advertisement of the colony's botanical resources, climate, and the enterprise of its settlers." So writes Mr. B. S. Thompson, of Normanby, in a paper read at a Conference of New Zealand Horticulturists held at Dunedin, and the following is a general outline of what he proposed.

In making a colonial State garden, whilst exotic trees and shrubs need not be discarded, a section of the ground should be reserved for the growth of indigenous trees, shrubs, and flowering plants alone, which would give the visitor a comprehensive view of the types of New Zealand flora, which, whilst each is beautiful in itself, form as a whole forest verdure unsurpassed on earth. But it would need the practical horticulturist to imbue the trees with qualities suitable to their surroundings, and to make those surroundings fitting for the trees, for New Zealand trees have in their natural habitat been so dependent on one another for mutual shelter that they will not stand uncared-for isolation. The beauty of New Zealand trees is little known outside New Zealand, too little known to the great majority within. It would be the work of a colonial society to introduce to notice the beauty and utility of a flora which it is the world's loss that it knows so little of. Many of the trees now growing in the New Zealand bush would make splendid specimen trees to beautify the parks of the Old Land; and the fire of the settler is always busy, the axe and saw of the lumberer seldom idle. Our birds are, some of them, lost; many are disappearing year by year, and the leafy homes which shelter them will perish if care is not exercised. It is undoubtedly true that many New Zealand trees will only be found in the

future in localities where the care of the horticulturist has planted them, and it is time to begin. And there are so many which deserve preservation. The well-known Ribbon-wood, or 'Kowhai,' is a most beautiful little tree, symmetrical in form, handsome in foliage, and floriferous as a *Deutzia*. The blooming of the exotic *Catalpa* is thought worthy in London of newspaper mention, but an equally charming sight is the New Zealand 'Hinau' in full bloom—and who except the man who spends much time in the bush has ever seen it? Its proximity can be discovered long ere it is seen by "the murmur of innumerable bees" feeding on its flowers. One imagines a bush hive is near; but, tracing the position by the hum of the bees, at length a tree is reached, symmetrical in the arrangement of its leaves and branches as the Walnut, whilst the whole area of its dome-like top is a mound of snowy blossoms, unbroken in its wealth of delicate racemes of bloom except for the little dancing dots of honey-sucking bees which over the whole are clamorously busy. And where is there a more strikingly beautiful and peculiar tree than the 'Rewarewa,' the Honeysuckle of the settler, with its dark-green foliage quaintly formed and its large red blooms; or the 'Karaka,' an enlarged and glorified Laurel, which has brought from the isles of the sea the scent of the spicy lands from which the Maoris brought it? Search the world, and where is a more gorgeous sight than a 'Titoki' in full fruit? In ordinary times a most strikingly beautiful tree, of charming foliage and refreshing colour, but when covered with its twin berries, red as liquid blood and black as Erebus, it is long ere the eye can turn away. And there are so many more. The New Zealand bush in its greens, as a whole, is inclined to be sombre; but how distinctly refreshing is the splendidly delicate foliage of the 'Tanekaha,' the Celery-topped Pine, to the eye seeking relief from its gaze on the darker beauties of the bush! What an immense range of form there is between the great round leaves of the 'Wharangi,' with their white under-surface, and the feathery foliage of the New Zealand Cedar, the 'Kawaka,' most graceful of trees where none are graceless! The 'Nikau' and the Mountain Palm (*Cordyline indivisa*), not to speak of the common Cabbage-tree, are as graceful and quaint and as truly tropical in appearance as the trees we associate in our minds with India's coral strand.

Imagine a collection of purely New Zealand trees, not ranged in straight rows in botanical sequence, but dispersed and intermixed with an eye to effect by a skilled landscape gardener, and could anything be more enthralling? Each specimen a gem, and the whole a lovely jewel. And in creeping plants our beautiful country is beautifully and bountifully rich. The red 'Rata' vine and the snowy *Clematis* are known to many, but where away from the primeval forest itself does one ever see that beautiful climber which has blossoms like the *Hardenbergia*, but whose every floret is not a little Pea but a miniature bell? It is for a colonial horticultural society to bring from their secret hiding-places these triumphs of Nature's handiwork, to care for them, and if possible, by hybridisation and selection, improve them. And of the smaller plants are there no possibilities about Solander's Orchid that its blooms of three distinct colours have appealed to none for culture and improvement? It is generally thought that it is but a plant interesting to botanists; but those who have gathered its racemes of flowers in the most barren lands of the colony wonder that

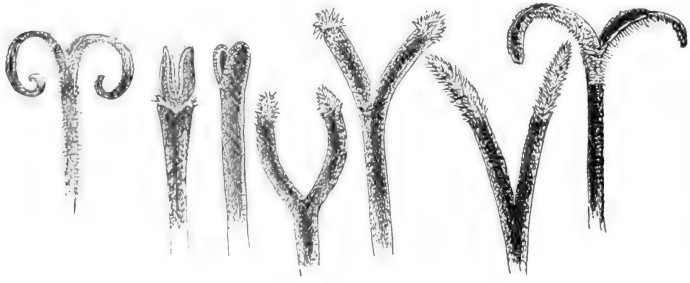
the professional florist does not imitate the enterprise of those who perfected the Wood Hyacinth.

At our late show a lady exhibitor staged a specimen of *Fuchsia procumbens*, brought from the slopes of Egmont, potted, and trained, and an Auckland florist wanted it and its great red berries for culture, propagation, and sale. Is it certain that none of our native fruits can be improved and become marketable produce in this and other lands? I have seen the berries of the common Tree Fuchsia as large as cherries and as luscious, where the tree had received adventitious aid from the manure applied to the garden of which it formed part of the boundary shelter. The berry of the 'Kawakawa' (*Piper excelsum*) has a piquant and distinct flavour of its own, and is as rich and luscious in its natural state as the 'Purupuru' is in pies; but what they are capable of becoming under skilled care can but be imagined by those who have had their teeth set on edge by the British Sloe, and, as a result, scorned the parent of the Plum. The 'Tataramoa,' the native Bramble, though the fruit is naturally rather small, is as desirable as some of the Brambles sent from America as novelties, with the advantage, as far as I can judge, of confining its superfluous energies to the production of foliage and fruit rather than in a rampant root-growth which cannot be suppressed.

With the latent qualities of these and others, only a society devoted to horticulture (and to the horticulture specially of our adopted country) can deal. The conditions of trade in the colonies are not such as to leave professional gardeners and nurserymen sufficient means and leisure to enable them to devote the time required to experiment. There is here no leisured class with inclination and wealth to adopt experimental horticulture as a pastime or with the hope of doing good. But, as our numerous horticultural societies show, we have innumerable colonists with a love for horticulture, and we certainly have a Government most willing to assist in such beneficent operations. To that Government we should naturally turn for an endowment of land for experimental grounds and botanical gardens, the latter a colonial asset, which, in the course of years, we should hope to make equal to Kew in beauty and utility. But the Government, like the larger Providence, is inclined to help those who help themselves. A society would go with better grace to the Government for assistance, and with more hope of success, if it went, as went the fathers of the English society to King George, with vouchers for subscribed capital in its hands. At the same time there is no reason why a tentative and conditional promise of assistance should not be sought for from the Government.

As is the case with the English R.H.S., our proposed association would busy itself with the importation and establishment of new and rare plants from abroad. And it should be remembered that, having selected from the native forest of our islands beautiful and unknown plants and trees, an almost untouched source for purposes of cultivation and hybridisation, the society would have a rich capital in kind as a medium of exchange with other countries for exotic plants we might procure from them. It may be argued that the plants could be collected in their wild state and forwarded abroad to those who desired them; but such a transplanting more often than not

meets with failure. Growing in the forest each tree is sheltered by the dense undergrowth from winds which destroy, and the exterior faces of every bush have thick masses of Flax, Fern, and other sheltering plants, forming an ideal wind-break, which renders the thus enclosed forest land warm and genial to the growth of trees. The thick growth of shrubs growing in the intervals between the sites occupied by the larger standing trees supplies to each trunk trousers and skirts, and to transplant even a small tree from its natural nursery to the bleak outside would be as dangerous a proceeding as it would be to condemn a man in the garments of civilisation to the habits and sumptuary laws of the naked savage. But if the plants are raised from seed, tended and cared for, without undue coddling, hardened gradually to their new surroundings, careful selection will eventually fit New Zealand trees to take their places as ornaments in the parks and pleasure-grounds of the civilised world. The Royal Horticultural Society of Great Britain prides itself with justice in having first grown and distributed over the British Islands and the Continent "the new plants discovered by Reeves, Potts, Dampier, Parks, and Fortune in China and in the East Indies; by Don on the west coast of Africa, South America, and the West Indies; by Forbes at the Cape of Good Hope and in the Zambesi region; by Douglas in North America; and by Hartwig in Central America." It is to be hoped that future years will enable the yet nascent Royal Horticultural Society of New Zealand to report that it has introduced to the admiration of the world many of the noble trees, floriferous shrubs, and charming flowering plants which now waste their sweetness on the desert air, and that its own gardens will show how greatly they have benefited in the process by the collection of exotic trees sent in exchange or otherwise introduced. Such seeds and plants as *Cordyline indivisa* and *Ranunculus Lyallii* are eagerly sought by British nurserymen now. It is not necessary for me to mention the list of functions the Home society undertakes; it is to be found in the reports; it is sufficient to remark that a New Zealand society would hope in time to undertake them all, although the people will probably have to acquire a much richer life before the culture and hybridisation of Orchids will be called for. Trials of fruits, plants, and seeds at the request of every Fellow and the distribution of surplus plants *pro rata* according to the amount of annual subscription, however, would be undertaken earlier.



THE DAFFODIL: ITS ROOT PROGRESS FROM PLANTING TO FLOWERING.

By W. Bartholomew, F.R.H.S.

There is very little literature on the Daffodil, and what there is concerns the flower only.

The greater part of this information is only to be found in the catalogues of bulb merchants and bulb-growers.

These sources give an excellent idea of the colour, shape, and special points of each variety, and one catalogue in particular gives the very important information as to the order in which they flower.

It is generally understood that August to September is the proper time to plant bulbs—a conclusion arrived at by experience—but I cannot find that any special observations or experiments have ever been made to determine accurately how long these bulbs remain dormant *naturally* (dry and cool storage will compel them to be dormant); nor could I find whether certain bulbs require earlier planting, or any information as to the length of these roots; nor is it common knowledge what growth the roots have made when the plumule first appears.

Being anxious to acquire this information, and thinking that some exact knowledge of the behaviour of the roots of Narcissi from planting to flowering would be some little addition to the literature of the Daffodil, I proposed to myself the following questions, to be answered by experiments.

Questions to be Answered by Experiments.

(1) What is the natural period of rest required by Narcissi after the foliage has died down, and do some varieties require earlier planting than others, or are all alike in activity, in the desire to root?

(2) What number of days elapse between the first signs of rooting and flowering, and do all varieties demand the same period?

(3) Have the roots attained their maximum growth when the plumule first appears, or do the roots and plumule grow simultaneously?

(4) What length of roots have these bulbs at flowering, and do all require the same depth of soil?

(5) Do all roots strike vertically, or do some prefer a horizontal course?

(6) Do all varieties show signs of rooting earlier in water than in soil, and will an experiment with similar bulbs in water and in soil simultaneously indicate which prefer moisture and which well-drained soil?

(7) Do bulbs at a depth of four inches from ground-surface enjoy comparative warmth in winter and coolness in summer?

Having laid down the lines of information desired, I was kindly advised by Miss Willmott, Rev. G. Engleheart, and Mr. R. Sydenham as to the varieties in the four groups to experiment and observe upon.

The end of July was recommended as the best time to commence my observations.

I procured through Mr. R. Sydenham some choice bulbs, all as nearly as possible uniform in weight, of each variety from a Guernsey firm and started my observations on July 26, 1902.

In my garden border at Clapham, having a north-west aspect, I planted twenty-four rows of eight bulbs to the row; each row represented a variety.

The soil was a medium garden-soil, inclined to be strong. The ground was trenched twelve inches deep, but no manure of any kind was used, so that the quality of the soil may be considered as "very moderate."

All the bulbs were planted with two inches of soil over the crowns, and the first bulb in each row was examined daily until signs of rooting were recorded, the bulb being carefully replaced at same depth and properly covered with soil after each examination. This was the most tedious part of the experiment.

After rooting had commenced, a bulb was carefully dug up from each row on the 26th of each month and the progress of root and plumule recorded.

Twice during the experiment the twenty-four varieties were photographed, so that the progress would more readily appeal to the eye.

Simultaneously with planting the bulbs in soil I placed a representative bulb of the twenty-four varieties in some special observation glasses I had made, the water just touching the stem, and in each glass I placed a lump of charcoal to keep the water sweet, renewing the water from time to time as required.

In these glasses the first signs of rooting were detected with the greatest ease and their progress followed daily and recorded on the 26th of each month, at the same time as those in soil.

These observation glasses were placed on a shelf protected from the weather on my garden wall, facing east, and remained outside all winter; on frosty nights I protected them with a curtain, but on two occasions there was thin ice on the water, and so I kept the conditions of the bulbs in water and soil as much as possible alike.

From the records taken from those in soil and those in water I constructed the following tables and observations of progress.

Refer to tables in soil and water, pages 174 *et seq.*

The tables and observations answer to a great extent the questions proposed at the beginning of the experiment.

Enthusiasts who have made Narcissi a study will be able to form many deductions by examining these figures.

Hybridists conversant with the crosses will be interested to trace traits of the parentage, and should assist judgment as to future crossing on good rooting varieties.

Growers should find indications as to the depth of soil required, and, as far as the limited varieties go, which bulbs are the most active and require early planting, and which will bear later.

The following remarks occur to me, and I mention them in the order of the columns.

I was careful at the beginning to take the diameter and weight of bulbs of each variety for two reasons:

(1) For comparison as to results.

(2) To determine whether density had any influence on free rooting or robustness.

The columns show great variations; for instance, 'Cernuus plenus' is the same diameter as 'Cernuus,' yet the the specific gravity of the former is 2 ounces to the dozen heavier.

'Cernuus' is a bulb of easy culture, but 'Cernuus plenus' is most difficult to cultivate, and I thought perhaps the great density of this marble-like bulb was just the difference between failure and success.

Results show this is not so. 'Autocrat,' with the same diameter and 1 ounce per dozen heavier than 'Cernuus plenus,' is described in my observations as "extremely vigorous and a model root." (See 10 and 10A in figs. 35 and 37.)

In striking contrast is 'Queen of Spain,' having the same diameter as 'Cernuus plenus,' but 3 ounces per dozen *lighter*. This bulb produced the scantiest roots of all the twenty-four varieties, these two cases proving that density is no criterion and has no bearing on free rooting or robustness. (See 4 and 4A in figs. 35 and 37.)

Nor is size of any importance as to the number of rootlets, as 'Grand Monarque,' with its diameter of $2\frac{5}{8}$ inches, only produced in soil 25 rootlets as against 'Obvallaris,' $1\frac{3}{4}$ inch diameter, with its 164 rootlets.

I noticed the bulbs 'Autocrat,' 'Stella,' and 'Campernelle rugulosus' had very large stems for such small bulbs; yet all these had model roots. (See 10, 10A, 11, 11A, 19, 19A in figs. 35, 36, 37, 38.)

'Cernuus plenus' and 'Queen of Spain' the *smallest*: is this a coincidence merely?

It is not always practicable to plant bulbs in July. In wet or late years the foliage is not dead, and they cannot be lifted till the first or second week of August.

The Polyanthus group are the latest to die down.

I want to specially point out that the bulbs I planted were only lifted seven days previous to the date of planting, and the Polyanthus were disturbed even before the foliage was ripe, so that I should have them by July 26.

Referring to my figures in column (*c*), page 170, I find the most active of all the bulbs was 'Jaune Suprême,' which showed signs of rooting in thirteen days after planting.

I have already explained that this bulb was lifted before the foliage was ripe, and for argument's sake we shall say it was not dormant at time of lifting and required a further seven days; then the period of rest of this particular bulb would be only thirteen days.

'Mont Cenis' was almost as active in nineteen days.

In contrast to this great activity, 'Prins Metternich,' of the same group, was fifty-two days planted before it showed signs of rooting, and, with the exception of 'Orange Phœnix,' was the most dormant of all; yet this sleepy bulb flowered only six days later than wakeful 'Jaune Suprême.'

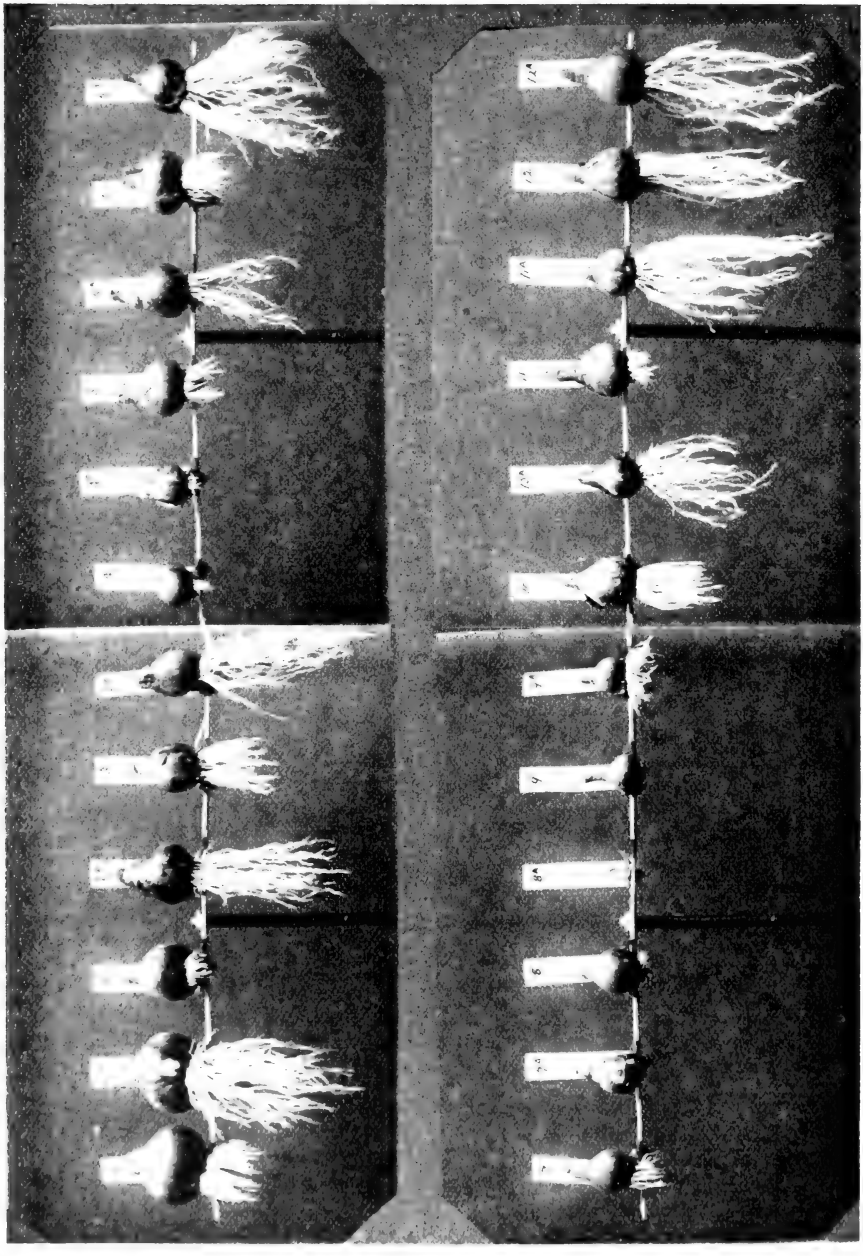


FIG. 35.—PHOTOS: TAKEN SEPTEMBER 26, 1902.

The bulbs are in pairs—one grown in water, the other in soil. Bulbs grown in water are indicated by a numeral, those grown in soil by the same numeral with the letter A added.

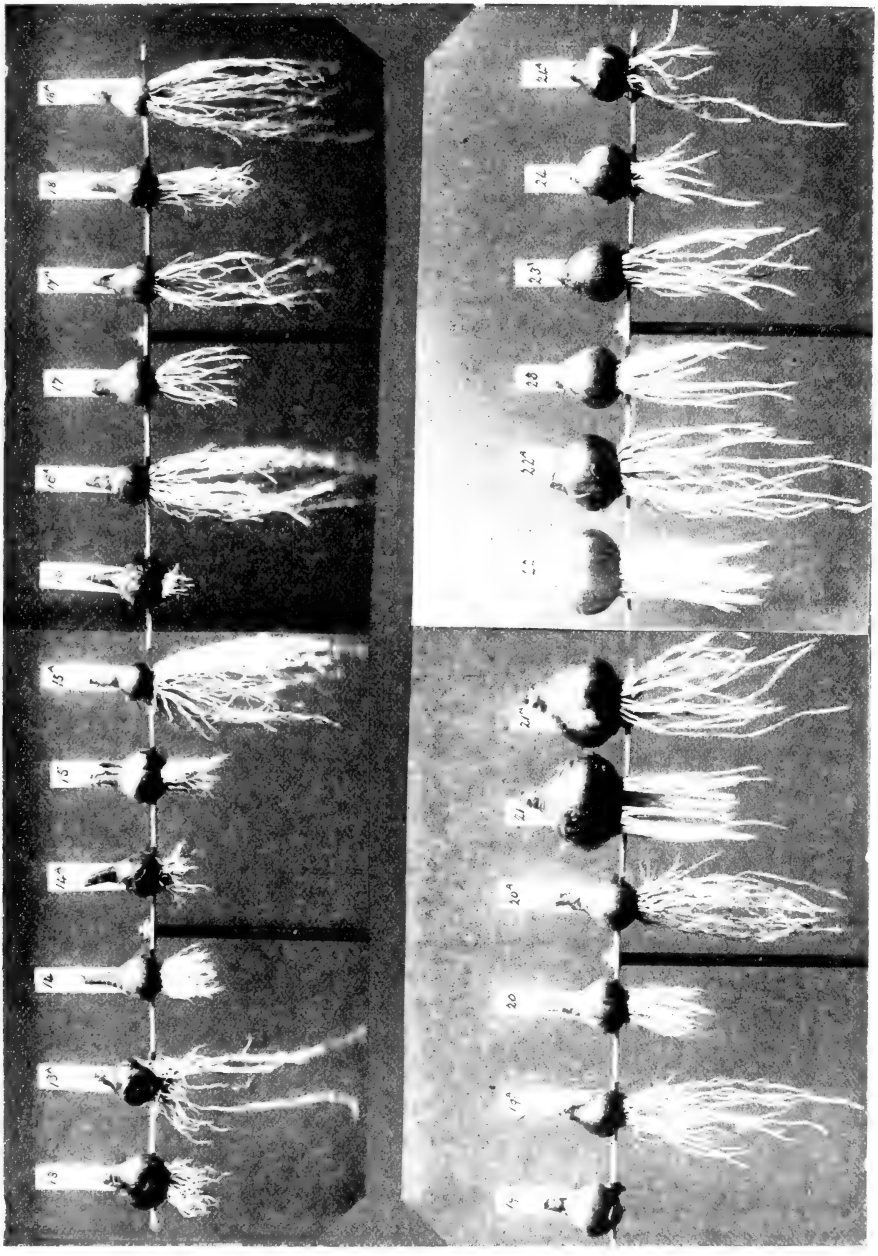


FIG. 36.—PHOTOS: TAKEN SEPTEMBER 26, 1902.

The bulbs are in pairs - one grown in water and the other in soil. Bulbs grown in water are indicated by a numeral, those grown in soil by the same numeral with the letter A added.

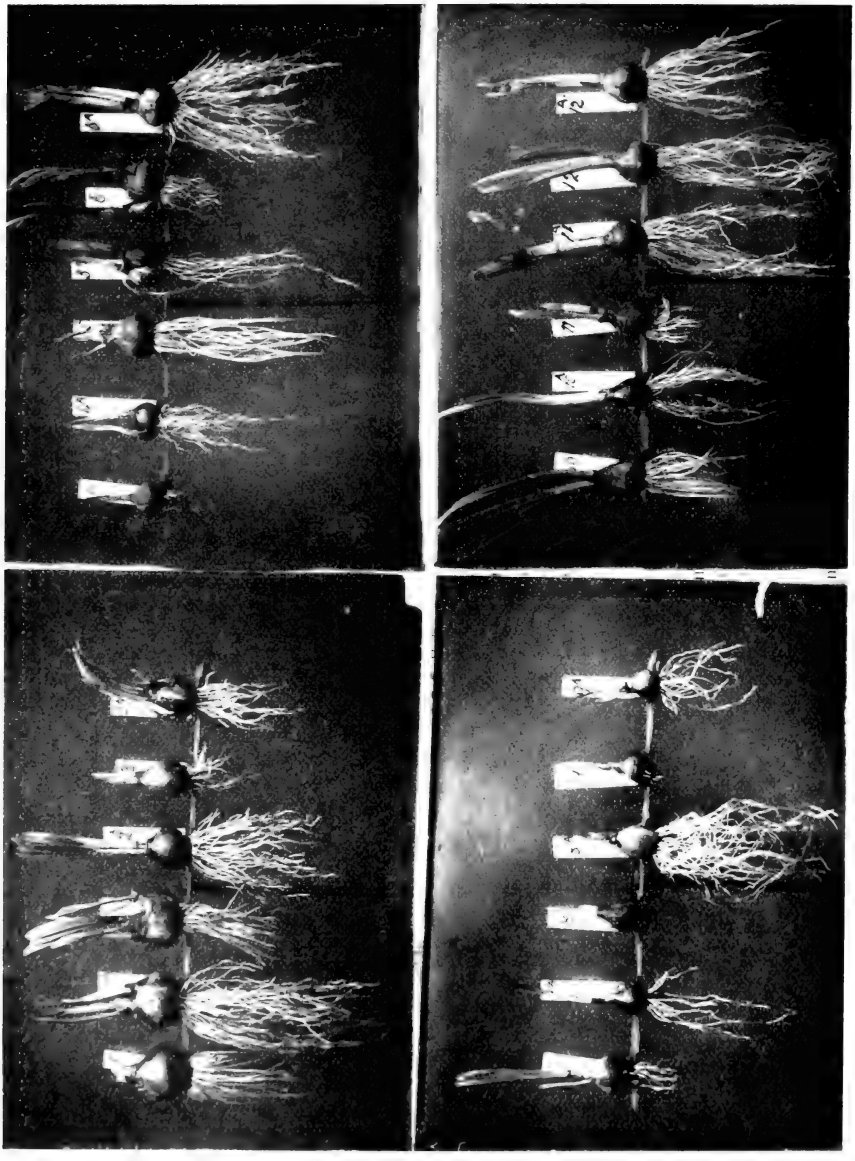


FIG. 37.—PHOTOS: TAKEN JANUARY 26, 1903.
The bulbs are in pairs—one grown in water and the other in soil. Bulbs grown in water are indicated by a numeral, those grown in soil by the same numeral with the letter A added.

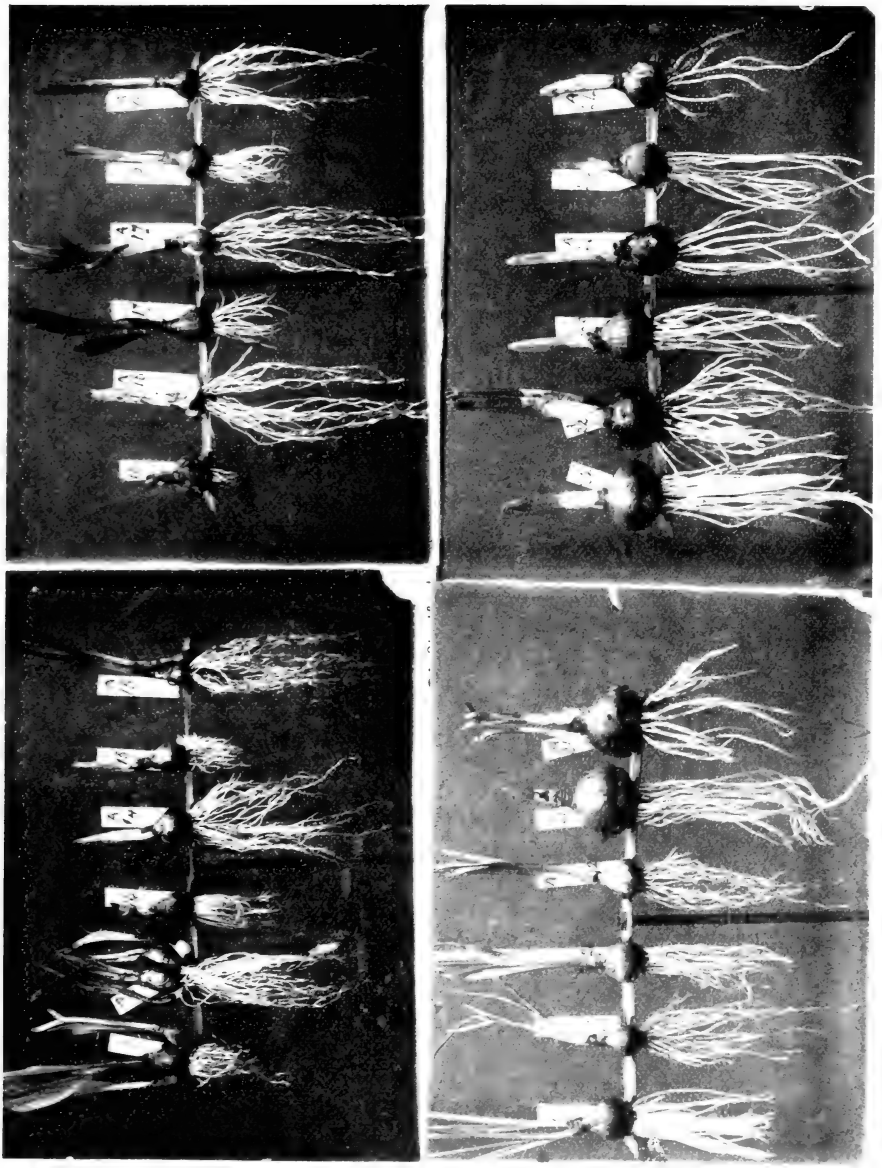


FIG. 38. PHOTOS: TAKEN JANUARY 26, 1903.

The bulbs are in pairs — one grown in water and the other in soil. Bulbs grown in water are indicated by a numeral, those grown in soil by the same numeral with the letter A added.

1902-1903.

TABLES AND OBSERVATIONS ON THE PROGRESS OF THE ROOTS OF NARCISSI (24 VARIETIES) IN SOIL FROM PLANTING TO FLOWERING.

Group		Name of bulb.	Diameter of bulb.	Weight per dozen.	Date bulb was planted.	Number of days before signs of rooting appeared.	Number of days from rooting to flowering.	Date of flowering.	Length of root when plumule first appeared.	Average length of roots on March 26.	Number of rootlets.	Description of roots. See also photographs taken September 26 and January 26.
			ins.	lb. oz.					ins.	ins.		
Magni-Coronati	1A	Emperor	2 3/8	2 8	July 26	49	189	March 21	9	9	110	Vigorous, well distributed round bulb, numerous
	2A	Golden Spur	2	1 7	,,	36	176	February 23	5	6 1/2	105	Vigorous, cable-like, thickly matted
	3A	Albicans	1 1/2	12	,,	49	189	March 21	5 1/4	6	49	Scanty, healthy, well distributed
	4A	Queen of Spain	1 1/4	7	,,	42	198	,, 23	4 1/2	6 3/4	8	Extremely scanty, but vigorous, badly distributed
	5A	Orange Phœnix	1 3/4	1 0	,,	59	179	,, 21	8	9 1/4	64	Shapely, vigorous, a model vertical root
	6A	Obvallaris	1 3/8	1 3	,,	35	176	,, 22	5	9	164	Intensely matted, vigorous, inclined horizontally
	7A	Cernuus	1 1/4	8	August 26	20	172	,, 6	5 1/2	6 1/2	30	Scanty but vigorous, well distributed
	8A	Cernuus plenus	1 1/4	10	,,	18	186	,, 19	8	8	35	Silky, very white, vigorous, well distributed, healthy, scanty
Medio-Coronati	9A	Princess Mary	1 1/8	5	,,	20	182	,, 16	1 3/4	6	61	Scanty, hair-like, evenly distributed, not robust, very horizontal
	10A	Autocrat	1 1/2	11	July 26	28	208	,, 19	6 1/2	10 1/4	77	Extremely vigorous, well distributed, fine model, vertical
	11A	Stella	1 5/8	13	,,	28	206	,, 17	6	9	78	Extremely vigorous, well distributed, fine model, vertical
	12A	M. M. de Graaff	1 5/8	1 0	,,	38	206	,, 27	6	6 1/4	47	Strong, vigorous, well distributed, scanty
	13A	Minnie Hume	1 1/2	1 0	,,	20	215	,, 18	6	10 1/2	84	Strong, vigorous, well distributed
	14A	Mrs. Langtry	1 5/8	11	,,	27	221	,, 31	6 1/2	9	55	Fine, hair-like, silky, evenly distributed, scanty
	15A	Queen Bess	1 1/4	7	,,	15	204	,, 2	7 1/4	10	65	Healthy, silky, wavy, fairly distributed
Parvi-Coronati	16A	Poeticus ornatus	1 3/8	10	,,	41	207	,, 31	7 1/2	10	63	Vigorous, fine, well distributed
	17A	John Bain	1 1/2	9	,,	27	211	,, 21	6	8	55	Strong, vigorous, well distributed, but scanty
	18A	Falstaff	1 1/4	7	,,	17	223	,, 23	7	9 1/2	53	Scanty, healthy, evenly distributed, but unequal lengths
	19A	Campernelle rug.	1 3/8	12	,,	27	195	,, 5	7	10 1/2	48	Scanty, healthy, evenly distributed
	20A	Flora Wilson	1 1/2	12	,,	49	195	,, 27	6 1/4	8 3/4	56	Scanty, well grown, evenly distributed
Polyanthus	21A	Grand Monarque	2 5/8	3 14	,,	34	214	,, 31	9 3/4	9 3/4	25	Cable-like, vigorous, badly distributed, scanty, inclined horizontally
	22A	Mont Cenis	2 3/8	2 8	,	19	205	,, 7	7 1/2	14	34	Cable-like, vigorous, well distributed, scanty, fairly vertical
	23A	Jaune Suprême	1 7/8	1 8	,,	13	227	,, 23	6	10 1/4	32	Cable-like, vigorous, well distributed, scanty
	24A	Prins Metternich	1 7/8	1 5	,,	52	194	,, 29	7	8 1/4	12	Cable-like, vigorous, badly distributed, extremely scanty
			(a)		(b)	(c)	(d)	(e)	(f)	(g)	(h)	

TABLES AND OBSERVATIONS ON THE PROGRESS OF THE ROOTS OF NARCISSI (24 VARIETIES) IN **WATER** FROM PLANTING TO FLOWERING.

Group.		Name of bulb.	Diameter of bulb.	Weight per dozen.	Date bulb was planted.	Number of days before signs of rooting appeared.	Number of days from rooting to flowering.	Date of flowering.	Length of root when plumule first appeared.	Average length of roots on March 26.	Number of rootlets.	Description of roots. See also photographs taken September 26 and January 26.
			ins.	lb. oz.					ins.	ins.		
Magni-Coronati	1	Emperor	$2\frac{2}{32}$	2 8	July 26	38	216	April 5	$5\frac{3}{8}$	$5\frac{3}{4}$	133	Strong, wiry, well distributed, matted
	2	Golden Spur	2	1 7	,,	46	166	February 22	$2\frac{7}{8}$	$4\frac{1}{4}$	82	Strong, healthy, wiry, irregular length
	3	Albicans	$1\frac{15}{16}$	12	,,	30	210	March 22	3	3	70	Thickly rooted, strong, vigorous, yellow tint
	4	Queen of Spain	$1\frac{14}{16}$	7	,,	35	205	,,	$\frac{1}{8}$	$1\frac{1}{4}$	14	Scanty, unhealthy, brown, stopped growing
	5	Orange Phœnix	$1\frac{13}{16}$	1 0		47	178	March 7	$5\frac{1}{4}$	$6\frac{1}{4}$	63	Very healthy and well distributed round bulb
	6	Obvallaris	$1\frac{13}{16}$	1 3		34	173	February 17	$1\frac{3}{4}$	$2\frac{5}{8}$	146	Thickly matted, wiry, vigorous, short
	7	Cernuus	$1\frac{1}{4}$	8	August 26	18	168	,, 27	$1\frac{1}{2}$	2	30	
	8	Cernuus plenus	$1\frac{1}{4}$	10	,,	18	194	March 25		—	12	
Medio-Coronati	9	Princess Mary	$1\frac{1}{16}$	5	,,	31	173	,, 17	$\frac{1}{16}$	$\frac{1}{8}$	25	Stopped growing January, unhealthy, scanty
	10	Autocrat	$1\frac{1}{4}$	11	July 26	38	196	,, 16	4	4	61	Silvery, vigorous, healthy, well distributed, a model
	11	Stella	$1\frac{15}{16}$	13	,,	47	187	,, 16	2	2	67	Silvery, vigorous, healthy, well distributed, a model
	12	M. M. de Graaff	$1\frac{15}{16}$	1 0	,,	10	224	,, 16	$6\frac{3}{4}$	9	53	Silky, vigorous, healthy, well distributed, uniform length
	13	Minnie Hume	$1\frac{15}{16}$	1 0	,,	36	200	,, 18	$2\frac{3}{8}$	$3\frac{1}{4}$	68	Wavy, healthy, well distributed round stem
	14	Mrs. Langtry	$1\frac{13}{16}$	11	,,	37	212	,, 31	$3\frac{5}{16}$	$3\frac{5}{16}$	67	Silky, healthy, well distributed
	15	Queen Bess	$1\frac{1}{4}$	7	,,	17	216	,, 15	$2\frac{1}{2}$	$2\frac{1}{2}$	114	Bristly, matted, stunted, but healthy
Parvi-Coronati	16	Poeticus ornatus	$1\frac{1}{16}$	10	,,	54	193	,, 31	$\frac{3}{4}$	$1\frac{3}{8}$	25	Early stopped growing, puny, unhealthy
	17	John Bain	$1\frac{1}{4}$	9	,,	19	217	,, 18	$3\frac{1}{4}$	$3\frac{1}{4}$	34	Scanty but healthy and vigorous
	18	Falstaff	$1\frac{1}{4}$	7	,,	22	218	,, 22	3	$3\frac{1}{4}$	51	Silky, healthy, well distributed
	19	Campernelle rug.	$1\frac{1}{16}$	12	,,	62	150	February 22	2	$5\frac{1}{2}$	70	Healthy, strong, well distributed, uniform length, beautiful
	20	Flora Wilson	$1\frac{1}{2}$	12	,,	36	208	March 26	5	6	56	Healthy, vigorous, unequal length
Polyanthus	21	Grand Monarque	$2\frac{5}{16}$	3 14	,,	36	207	,, 25	$8\frac{1}{2}$	$10\frac{1}{2}$	38	Thick cable-like, well distributed, extra vigorous, healthy
	22	Mont Cenis	$2\frac{3}{16}$	2 8	,,	31	228	April 10	$5\frac{1}{2}$	$9\frac{1}{4}$	64	Thick cable-like, well distributed, vigorous, healthy
	23	Jaune Suprême	$1\frac{7}{16}$	1 8	,,	15	224	March 21	$5\frac{3}{4}$	$7\frac{1}{4}$	29	Very scanty, badly distributed, healthy, vigorous
	24	Prins Metternich	$1\frac{7}{8}$	1 5	,,	43	218	April 12	$7\frac{1}{4}$	$9\frac{1}{2}$	24	Scanty, cable-like, extra vigorous, healthy

The behaviour of 'Orange Phœnix' is also very interesting, the longest dormant, yet within seven days of being the first to flower, and I observe there is only one day difference in flowering in water and soil after roots appeared, a very consistent bulb and with perfectly shaped roots. (See 5, 5A in figs.)

The flowering stage was first reached by 'Cernuus' (in soil) in 172 days, followed a few days later by 'Obvallaris,' 'Golden Spur,' and 'Orange Phœnix.'

'Jaune Suprême,' which showed such activity in producing rootlets, took 227 days to show a bloom.

This bulb evidently requires a long time to develop a flower, and this remark also applies to 'Falstaff,' 'Mont Cenis,' and 'Queen Bess,' all of which root early and flower late.

On referring to column (*f*), I notice some bulbs reach the maximum of root-growth before the plumule appears, such as 'Emperor,' 'Cernuus plenus,' and 'Grand Monarque,' while others are only one-third the maximum (more or less). 'Princess Mary' was not one third.

The average length of roots of the twenty-four varieties is nine inches, 'Autocrat,' 'Minnie Hume,' 'Poeticus ornatus,' 'Campernelle rug.,' and 'Jaune Suprême' being amongst the longest. 'Mont Cenis' was fourteen inches.

The length of roots grown in soil exceeds those grown in water (see figs.).

The number of rootlets to each variety vary enormously, the maximum being 164, the minimum 12.

Equally as various is the appearance of the roots, some hair-like, some cable-like; but I certainly think the hair-like roots suggest refinement of the flower.

Narcissi roots are not much affected by disturbing them whilst growing, and their vitality is very great.

Each month I disturbed twenty-four (one of each variety), and after examination these were replanted in another part of the garden in the hope that they would flower; on one occasion they were lying on the garden-path twenty-four hours (December 26) before replanting.

All flowered well a few days later than those undisturbed, except 'Cernuus,' 'Queen of Spain,' and 'M. M. de Graaff,' and these were about fourteen days later.

The conclusions these tables suggest are briefly:

Bulbs that should be Planted First Week in August.

'Jaune Suprême,' 'Mont Cenis,' 'Falstaff,' 'Queen Bess,' 'Minnie Hume,' 'Princess Mary,' 'Cernuus plenus,' 'Cernuus.'

Second Week in August.

'Campernelle rugulosus,' 'John Bain,' 'Mrs. Langtry,' 'Stella,' 'Autocrat.'

Third Week in August.

'Flora Wilson,' 'Poeticus ornatus,' 'Queen of Spain,' 'Albicans,' 'Emperor,' 'Prins Metternich,' 'Orange Phœnix.'

The Bulbs Most Active in Soil.

'Jaune Suprême,' 'Mont Cenis,' 'Grand Monarque,' 'Campernelle rug.,' 'Falstaff,' 'Poeticus ornatus,' 'Queen Bess,' 'Mrs. Langtry,' 'Minnie Hume,' 'Stella.' 'Autocrat,' 'Princess Mary,' 'Golden Spur.' These indicate a preference for well-drained soil.

Bulbs Most Active in Water.

'Prins Metternich,' 'Flora Wilson,' 'John Bain,' 'M. M. de Graaff,' 'Cernuus,' 'Obvallaris,' 'Orange Phœnix,' 'Queen of Spain,' 'Albicans,' 'Emperor.' These indicate a preference for a moist soil.

'Princess Mary' and 'Cernuus plenus' absolutely refused to grow in water, although they showed *signs* of rooting as recorded (see 8 and 9 in figs. 35 and 37), but 'Cernuus plenus' grown in sharp road grit had perfect roots (see photo).

Bulbs Equally Active in Water and Soil.

'Jaune Suprême,' 'Grand Monarque,' 'Queen Bess,' 'Cernuus plenus,' 'Cernuus,' 'Obvallaris.'

At the close of my observations my only regret is that I had not more varieties to report on, as, if these tables are of any value, their usefulness would have been extended, but I may add to these another year. In that case I should propose to extend the information sought to the following questions:

(1) What date does the foliage die down and date of lifting (noting whether a wet or dry spring).

(2) Compare length of roots at lifting with those at flowering to see if there has been any increase.

A bulb-grower in Cambridge informs me that in the case of 'Albus plenus odoratus' they considerably lengthen their roots after flowering the first year, and is of the opinion that growth continues on without a break until the foliage dies down the second year; after that they do not increase; they are usually lifted in the fourth year. Experiment No. 2 may throw some light on this.

August 26, 1902.

TABLES RECORDING THE GROWTH OF RADICLE AND PLUMULE OF NARCISSI PLANTED JULY 26, 1902. OBSERVATIONS TAKEN MONTHLY, BUT DURING THIS MONTH EXAMINATIONS *daily* TO RECORD FIRST SIGNS OF ROOTING.

	Length of radicle in inches.		Notes.	Height of plumule in inches	
	Water.	Soil.		Water.	Soil.
			Magni-Coronati.		
1 Emperor			No signs of rooting		
2 Golden Spur			No signs of rooting		
3 Albicans			Roots appeared 30 days in water		
4 Queen of Spain			No signs of rooting		
5 Orange Phœnix			No signs of rooting		
6 Obvallaris			No signs of rooting		
7 Cernuus			Not planted until August 26		
8 Cernuus plenus			Not planted until August 26		
			Medio-Coronati.		
9 Princess Mary			Not planted until August 26		
10 Autocrat			Roots appeared 28 days in soil		
11 Stella			Roots appeared 28 days in soil		
12 M. M. de Graaff			Roots appeared 10 days in water		
13 Minnie Hume			Roots appeared 20 days in soil		
14 Mrs. Langtry			Roots appeared 27 days in soil		
15 Queen Bess			Roots appeared 15 days soil, 17 in water		
			Parvi-Coronati.		
16 Poeticus ornatus			No signs of rooting		
17 John Bain			Roots appeared 19 days water, 27 in soil		
18 Falstaff			Roots appeared 17 days soil, 22 in water		
19 Campernelle rug.			Roots appeared 27 days in soil		
20 Flora Wilson			No signs of rooting		
			Polyanthus.		
21 Grand Monarque			No signs of rooting		
22 Mont Cenis			Roots appeared 19 in soil, 31 days water		
23 Jaune Suprême			Roots appeared 13 in soil, 15 days water		
24 Prins Metternich			No signs of rooting		

The number preceding the name of each bulb is shown on the corresponding illustration, pages 166–169.

September 26, 1902.

TABLES RECORDING THE GROWTH OF RADICLE AND PLUMULE OF NARCISSI PLANTED JULY 26, 1902. OBSERVATIONS TAKEN MONTHLY. SEE ALSO ILLUSTRATIONS OF THIS DATE, PP. 166, 167.

	Length of radicle in inches.		Notes.	Height of plumule in inches.	
	Water.	Soil.		Water.	Soil.
			Magni-Coronati.		
1 Emperor	1¾	4½	Roots appeared 38 days water, 49 soil	nil	nil
2 Golden Spur	¾	4⅝	Roots appeared 36 days soil, 46 water	nil	nil
3 Albicans	2½	5¼	Roots appeared 49 days soil	nil	½
4 Queen of Spain	¾	½	Roots appeared 35 days water, 42 soil	nil	nil
5 Orange Phœnix	1¼	3⅜	Roots appeared 47 days water, 59 soil	nil	nil
6 Obvallaris	1½	5	Roots appeared 34 days water, 35 soil	nil	½
7 Cernuus	1¼	nil	Roots appeared 18 days water, 20 soil	nil	nil
8 Cernuus plenus	⅜	no sample	Roots appeared 18 days water	nil	—
			Medio-Coronati.		
9 Princess Mary	⅛	1⅜	Roots appeared 20 days soil, 31 water	nil	⅛
10 Autocrat	2½	4	Roots appeared 28 days soil, 38 water	nil	nil
11 Stella	⅛	6	Roots appeared 28 days soil, 47 water	nil	⅛
12 M. M. de Graaff	5	6	Roots appeared 38 days soil	nil	½
13 Minnie Hume	1½	6	Roots appeared 36 days water	nil	⅜
14 Mrs. Langtry	1¾	1½	Roots appeared 37 days water	nil	nil
15 Queen Bess	1¾	7¼		nil	⅜
			Parvi-Coronati.		
16 Poeticus ornatus	¾	7½	Roots appeared 41 days soil, 54 water	nil	⅜
17 John Bain	3	6		nil	⅛
18 Falstaff	3¼	7		nil	1
19 Campernelle rug.	1/16	7	Roots appeared water 62 days	nil	1½
20 Flora Wilson	2½	6¼	Roots appeared 36 days water, 49 soil	nil	¾
			Polyanthus.		
21 Grand Monarque	4½	6½	Roots appeared 34 days soil, 36 water	nil	nil
22 Mont Cenis	4½	7½		nil	⅜
23 Jaune Suprême	5	6		nil	½
24 Prins Metternich	3¾	7	Roots appeared 43 days water, 52 soil	nil	½

October 26, 1902.

TABLES RECORDING THE GROWTH OF RADICLE AND PLUMULE OF NARCISSI PLANTED JULY 26, 1902. OBSERVATIONS TAKEN MONTHLY.

	Length of radicle in inches.		Notes.	Height of plumule in inches.	
	Water.	Soil.		Water.	Soil.
			Magni-Coronati.		
1 Emperor	3	9	Inclined to be horizontal	nil	$\frac{1}{2}$
2 Golden Spur	2	5		nil	$\frac{3}{4}$
3 Albicans	3	$4\frac{3}{4}$		nil	$1\frac{1}{4}$
4 Queen of Spain	$1\frac{3}{4}$	$\frac{1}{2}$		nil	nil
5 Orange Phœnix	4	8		nil	$1\frac{1}{2}$
6 Obvallaris	$1\frac{3}{4}$	$5\frac{1}{2}$		$\frac{1}{4}$	$1\frac{3}{8}$
7 Cernuus	$1\frac{1}{2}$	$5\frac{1}{2}$		$\frac{1}{8}$	$\frac{1}{8}$
8 Cernuus plenus	$\frac{1}{2}$	n.s.	No progress, crabbed, crinkled yellow bristles	nil	n.s.
			Medio-Coronati.		
9 Princess Mary	$\frac{1}{8}$	4	No progress in water, roots very horizontal in soil	nil	$\frac{7}{8}$
10 Autocrat	4	$6\frac{1}{2}$		$\frac{1}{8}$	$1\frac{1}{2}$
11 Stella	$1\frac{3}{4}$	8		nil	$1\frac{3}{4}$
12 M. M. de Graaff	$6\frac{3}{4}$	8		$\frac{1}{4}$	$1\frac{1}{4}$
13 Minnie Hume	$2\frac{3}{4}$	$9\frac{3}{4}$	Roots very horizontal in soil	$\frac{1}{2}$	2
14 Mrs. Langtry	3	$6\frac{1}{2}$	Roots very vertical in soil	nil	$\frac{3}{4}$
15 Queen Bess	$2\frac{1}{4}$	$9\frac{1}{2}$		nil	$1\frac{3}{8}$
			Parvi-Coronati.		
16 Poeticus ornatus	$\frac{3}{4}$	$7\frac{1}{2}$		nil	$\frac{3}{4}$
17 John Bain	$3\frac{1}{4}$	7	Roots medium	$\frac{3}{4}$	$1\frac{3}{4}$
18 Falstaff	$3\frac{1}{4}$	7	Roots medium	$\frac{3}{4}$	$1\frac{1}{4}$
19 Campernelle rug.	$1\frac{3}{4}$	8	No progress until the 12th, growth now rapid	nil	$2\frac{1}{2}$
20 Flora Wilson	4	7	Roots very vertical	nil	$1\frac{1}{2}$
			Polyanthus.		
21 Grand Monarque	6	10	Roots very horizontal	nil	$1\frac{1}{4}$
22 Mont Cenis	$5\frac{1}{2}$	$10\frac{1}{2}$	Inclined to be horizontal	$\frac{1}{2}$	2
23 Jaune Suprême	$5\frac{1}{2}$	$7\frac{1}{2}$	Inclined to be horizontal	$\frac{1}{4}$	$1\frac{1}{4}$
24 Prins Metternich	6	$6\frac{1}{2}$	Roots vertical	nil	1

November 26, 1902.

TABLES RECORDING THE GROWTH OF RADICLE AND PLUMULE OF NARCISSI PLANTED JULY 26, 1902. OBSERVATIONS TAKEN MONTHLY.

—	Length of radicle in inches.		Notes.	Height of plumule in inches.	
	Water.	Soil.		Water.	Soil.
			Magni-Coronati.		
1 Emperor . .	4	$8\frac{3}{4}$		nil	$1\frac{3}{4}$
2 Golden Spur .	$2\frac{7}{8}$	$5\frac{1}{2}$		$\frac{1}{8}$	$2\frac{1}{2}$
3 Albicans . .	3	$6\frac{1}{2}$		$\frac{5}{8}$	$2\frac{1}{2}$
4 Queen of Spain .	$\frac{3}{4}$	$4\frac{1}{2}$		$\frac{1}{8}$	1
5 Orange Phœnix .	$5\frac{1}{4}$	9		$\frac{1}{8}$	$2\frac{3}{4}$
6 Obvallaris . .	2	$5\frac{1}{2}$		$\frac{3}{4}$	2
7 Cernuus . .	$1\frac{3}{4}$	$4\frac{1}{2}$		$\frac{1}{2}$	1
8 Cernuus plenus .	$\frac{1}{2}$	5		nil	$\frac{1}{4}$
			Medio-Coronati.		
9 Princess Mary .	$\frac{1}{8}$	$4\frac{1}{2}$	Will not grow in water	$\frac{5}{8}$	$1\frac{1}{4}$
10 Autocrat . .	$4\frac{5}{8}$	$12\frac{1}{4}$		$\frac{3}{4}$	$2\frac{1}{4}$
11 Stella . .	2	$12\frac{1}{4}$		nil	2
12 M. M. de Graaff .	$7\frac{1}{2}$	$8\frac{3}{4}$		$\frac{3}{4}$	2
13 Minnie Hume .	3	8		$1\frac{1}{4}$	2
14 Mrs. Langtry .	$3\frac{1}{2}$	$6\frac{1}{2}$		nil	$\frac{7}{8}$
15 Queen Bess . .	$2\frac{1}{2}$	7		nil	$2\frac{1}{4}$
			Parvi-Coronati.		
16 Poeticus ornatus .	$\frac{3}{4}$	$10\frac{1}{2}$		$\frac{1}{8}$	$1\frac{3}{8}$
17 John Bain . .	$3\frac{1}{4}$	$7\frac{1}{4}$		$1\frac{1}{4}$	$1\frac{1}{2}$
18 Falstaff . .	$3\frac{1}{4}$	$7\frac{1}{4}$		$\frac{7}{8}$	$2\frac{1}{8}$
19 Campernelle rug. .	$3\frac{1}{2}$	$7\frac{1}{2}$		$1\frac{1}{4}$	$3\frac{3}{4}$
20 Flora Wilson .	5	$7\frac{3}{4}$		$\frac{5}{8}$	$2\frac{1}{2}$
			Polyanthus.		
21 Grand Monarque .	$7\frac{1}{2}$	$9\frac{1}{2}$		nil	$2\frac{3}{8}$
22 Mont Cenis . .	$6\frac{3}{4}$	$7\frac{1}{2}$		$\frac{7}{8}$	$2\frac{1}{2}$
23 Jaune Suprême .	$5\frac{1}{2}$	$6\frac{1}{2}$		$\frac{3}{4}$	$2\frac{3}{8}$
24 Prins Metternich .	$7\frac{1}{4}$	9		$\frac{1}{4}$	$1\frac{5}{8}$

December 26, 1902.

TABLES RECORDING THE GROWTH OF RADICLE AND PLUMULE OF NARCISSI PLANTED JULY 26, 1902. OBSERVATIONS TAKEN MONTHLY.

	Length of radicle in inches.		Notes.	Height of plumule in inches.	
	Water.	Soil.		Water.	Soil.
			Magni-Coronati.		
1 Emperor	5	7½		nil	1½
2 Golden Spur	3¾	7		1⅛	2½
3 Albicans	3	7½		1¼	2½
4 Queen of Spain	⅝	5		⅝	nil
5 Orange Phœnix	6¾	8¼		1	3¾
6 Obvallaris	2¼	6		1¾	2¾
7 Cernuus	1¾	5½		1⅝	2
8 Cernuus plenus	—	8	Water bulb now planted in soil	—	¼
			Medio-Coronati.		
9 Princess Mary	¾	8½		1¼	2½
10 Autocrat	4⅝	8		2	2¾
11 Stella	2	6¼		1⅝	2½
12 M. M. de Graaff	8½	6½		1⅝	2½
13 Minnie Hume	4	9¼		4	2¾
14 Mrs. Langtry	3⅝	7½		¼	2
15 Queen Bess	2½	7½		½	3½
			Parvi-Coronati.		
16 Poeticus ornatus	⅞	8		⅜	2½
17 John Bain	3¼	8¼		3	2¾
18 Falstaff	3½	7¼		1¼	3
19 Campernelle rug.	5	8½		5	7
20 Flora Wilson	5¾	7½		1⅜	3½
			Polyanthus.		
21 Grand Monarque	8½	10½		⅜	2¼
22 Mont Cenis	7¾	11		1½	3½
23 Jaune Suprême	7	10		1½	3
24 Prins Metternich	8	8		1¼	2¼

January 26, 1902.

TABLES RECORDING THE GROWTH OF RADICLE AND PLUMULE OF NARCISSI PLANTED JULY 26, 1902. OBSERVATIONS TAKEN MONTHLY. SEE ALSO ILLUSTRATIONS ON THIS DATE, PAGES 168, 169.

—	Length of radicle in inches.		Notes.	Height of plumule in inches.	
	Water.	Soil.		Water.	Soil.
			Magni-Coronati.		
1 Emperor	$5\frac{3}{4}$	$8\frac{1}{4}$		1	$4\frac{1}{4}$
2 Golden Spur	$4\frac{1}{2}$	$6\frac{1}{2}$	In bud (water and soil)	$4\frac{1}{4}$	5
3 Albicans	$3\frac{1}{8}$	$5\frac{3}{4}$		$1\frac{3}{4}$	$3\frac{3}{4}$
4 Queen of Spain	$\frac{3}{4}$	$6\frac{1}{2}$		$1\frac{3}{4}$	3
5 Orange Phœnix	7	8		$2\frac{1}{8}$	$3\frac{1}{2}$
6 Obvallaris	$2\frac{1}{2}$	7	In bud (water and soil)	$4\frac{1}{2}$	6
7 Cernuus	2	$6\frac{1}{4}$	In bud (water and soil)	$5\frac{1}{2}$	$4\frac{3}{4}$
8 Cernuus plenus	—	9		—	$1\frac{1}{2}$
			Medio-Coronati.		
9 Princess Mary	$\frac{3}{4}$	5		$2\frac{1}{2}$	2
10 Autocrat	$4\frac{3}{4}$	7	In bud (water and soil)	7	$7\frac{1}{2}$
11 Stella	2	$9\frac{1}{2}$		$2\frac{3}{4}$	$5\frac{1}{4}$
12 M. M. de Graaff	$9\frac{1}{4}$	$5\frac{1}{2}$		$5\frac{1}{2}$	5
13 Minnie Hume	4	8		8	$4\frac{1}{2}$
14 Mrs. Langtry	$3\frac{3}{4}$	$8\frac{1}{2}$		$1\frac{1}{4}$	3
15 Queen Bess	$2\frac{1}{2}$	10	In bud (soil)	$2\frac{3}{4}$	10
			Parvi-Coronati.		
16 Poeticus ornatus	$1\frac{1}{2}$	11		1	$3\frac{1}{2}$
17 John Bain	$3\frac{1}{2}$	$10\frac{1}{2}$	In bud (soil)	6	$6\frac{1}{4}$
18 Falstaff	$3\frac{1}{2}$	$8\frac{1}{2}$		4	$4\frac{3}{4}$
19 Campernelle rug.	$5\frac{3}{8}$	$9\frac{1}{4}$	In bud (water) nearly out	$12\frac{1}{2}$	$8\frac{1}{2}$
20 Flora Wilson	$6\frac{1}{4}$	$8\frac{1}{4}$		7	6
			Polyanthus.		
21 Grand Monarque	$10\frac{1}{4}$	$9\frac{1}{2}$		$2\frac{1}{2}$	$4\frac{1}{2}$
22 Mont Cenis	$8\frac{1}{2}$	$13\frac{1}{2}$	In bud (water)	$3\frac{1}{2}$	$5\frac{3}{4}$
23 Jaune Suprême	$7\frac{1}{4}$	$9\frac{1}{2}$		3	4
24 Prins Metternich	9	$7\frac{1}{2}$		2	3

TABLES RECORDING THE TEMPERATURE OF SOIL AND ATMOSPHERE TAKEN SIMULTANEOUSLY.

Soil temperature taken 4 inches *beneath* loamy soil at base of bulb at 8 A.M. weekly.
Atmosphere temperature at 12 inches *above* soil, north-west aspect, at the average height of bloom.

Average temperature per month.	Temperature of soil. Weeks. 1st.	2nd.	3rd.	4th.	Notes.	Temperature of atmosphere. Weeks. 1st.	2nd.	3rd.	4th.
August, 55°	55	55	58	54	Wet and cold	64	62	63	60
September, 52°	57	50	51	50		62	49	53	50
October, 47°	48	50	45	46		50	55	47	47
November, 43°	45	47	36	44		49	51	39	49
December, 38°	36	32	42	43		35	34	45	46
January, 36°	39	34	32	40	Sharp frosts	45	33	35	45
February, 41°	41	44	38	43	Rain after long drought	44	46	39	49
March, 41°	39	39	40	45		43	43	49	52
April, 40°	46	36	40	40		47	46	50	47
May									
June									
July									

ARCHIBALD F. BARRON, V.M.H.

BORN AT BANCHORY, ABERDEENSHIRE, 1835;
DIED AT CHISWICK, MIDDLESEX, APRIL 15, 1903.

A TRULY great and practical gardener has passed away from our midst, and one whose career has long been intimately associated with the Royal

FIG. 39.—THE LATE MR. A. F. BARRON, V.M.H. (*Journal of Horticulture.*)

Horticultural Society, and to whom the Society in past years has been under the deepest obligation.

Born of a gardening stock—for his father was a gardener on Deeside—Mr. Barron from his earliest childhood showed an instinctive taste for

the pursuit, and served his first apprenticeship under his father in the gardens of Crathie Castle. Thence, in the year 1853, when he was eighteen years of age, he came south to the Marquis of Huntly's gardens at Orton Hall, near Peterborough, where he took part in the enlargement of the celebrated Orton Hall Pinetum, and was present at the planting of the first *Sequoia* (*Wellingtonia*) *gigantea*. Thence he came further south to the Duke of Norfolk's gardens at Arundel, which were then under the care of Mr. George McEwen, who was celebrated for his knowledge of, and skill in, fruit-growing, and it was here that Mr. Barron enlarged his experience in this particular branch of horticulture and built up a reputation which afterwards placed him amongst the foremost authorities on the subject of pomology.

From Arundel he removed to Suffolk and accepted a position at Shrublands Park, near Bury St. Edmunds, where Mr. Donald Beaton was head gardener, a man renowned for his cultivation of flowers. Subsequently he went down into South Wales and joined a brother in farming.

This varied experience under men who were mostly leaders, each in his own special line, in the gardening world stood Mr. Barron in good stead. For about this time his former chief at Arundel, Mr. McEwen, was appointed superintendent of the Society's gardens, and in 1857 he offered Mr. Barron a position under him at Chiswick. Mr. McEwen lived but a short time after his appointment, and was succeeded by Mr. George Eyles. In 1864 the superintendentship of the Society's new garden at South Kensington was separated from that of the garden at Chiswick, Mr. Barron being appointed to the latter, while Mr. Eyles retained South Kensington ; but on Mr. Eyles's retirement they were again united under Mr. Barron, who continued to hold both offices until South Kensington was given up at the close of 1887. In 1895, owing to increasing years and failing health, he was obliged to relinquish his post at Chiswick, the Council of the Society conferring on him a retiring pension of £180 a year, and the gardening fraternity generally presenting him with a purse of £500. He was also one of the first to receive the Victoria Medal of Honour for horticulture.

Besides the excellent work which Mr. Barron did for the Society and for horticulture at Chiswick, he made time to act as secretary for that excellent charity, the Gardeners' Orphan Fund, and his well-known influence and personality assisted in no small degree in raising the Fund to its present condition of prosperity.

As a writer, Mr. Barron will long continue to be known by his 'Vines and Vine Culture,' which will for many years to come remain the standard work upon the subject.

Mr. Barron died at Chiswick, hard by the garden he had tended so well, on April 15, 1903, in the sixty-eighth year of his age. His career, so honourable and brilliant, should serve as an incentive to all young gardeners to practise diligence and observation and all-roundness in their calling.

GARDEN IRISES AT CHISWICK, 1903.

A LARGE collection of the Rhizomatous classes commonly called 'Flag' or 'German' Irises was planted on the south side of the Garden on ground that had been previously trenched and well worked, but unfortunately many of the varieties failed to flower satisfactorily, and some not at all, as indeed has been the case all over the country, the reason being no doubt due to the cold season of 1902, which prevented the plants from becoming thoroughly ripened. These Irises are excellent subjects for dry banks and gravelly and sandy soils; but they love a full exposure to the sun. The following, a complete list of those that flowered, were inspected by the Floral Committee.

F.C.C. = First-class Certificate.
A.M. = Award of Merit.
× × × = Highly Commended.
× × = Commended.

I. GERMANICA VARIETIES.

The varieties in this group are amongst the earliest of the vigorous sorts to flower of which *I. germanica* is the type.

1. Germanica (Barr).—The German or common purple Flag Iris is one of the most accommodating of hardy plants, as it succeeds in nearly all soils and situations. Native of Central and Southern Europe.

2. Major (Barr).—A large and improved form of No. 1.

3. Purple King (Barr, Veitch).—A strong-growing variety, with large purple standards and broad deep purple falls, the basal part beautifully netted. An improvement on No. 1.

4. Violacea (Barr).—Vigorous habit; standards large deep violet-blue; falls bluish-purple, with a rich yellow beard.

II. AMŒNA SECTION.

The varieties in this group have plain white (or nearly so) standards and variously coloured falls.

5. Agamemnon (Veitch).—Same as No. 11.

6. Comte de St. Clair, × × × June 1, 1893 (Wilks, Barr).—Rather slender habit, with medium-sized flowers borne on a tall spike. Standards blush-white, deepening towards the edges; falls violet, edged and freely streaked with white.

7. Innocenza, × × × June 11, 1903 (Wilks, Selfe-Leonard, Veitch).—Vigorous habit, producing tall stout spikes of lovely flowers with incurving cream-white standards and paler falls, the latter delicately veined with purple on the basal parts; beard rich yellow.

8. Morpheus (Barr).—Sturdy habit; very free-flowering, but flowers rather small. Standards cream-white; falls purple, basal part white, beautifully veined with purple; beard rich yellow.

9. Mrs. H. Darwin, × × × June 11, 1903 (Selfe-Leonard, Veitch).—Sturdy habit, and delightfully free-flowering; flowers large, borne on strong stems; standards erect, white, with slightly wavy margins; falls white, reticulated with pale violet towards the base; beard light yellow. This is a week later than No. 7 in coming into flower.

10. Norma (Veitch).—Rather slender habit; moderately free-flowering; standards large, white, suffused with very pale lavender; falls very light purple; beard rich yellow.

11. Reticulata, × × × June 1, 1893 (Wilks, Barr).—Sturdy habit; standards white suffused with blue; falls violet-purple edge and streaked with white. Also received as 'Duchess of Wellington.'

III. Aphylla Varieties.

The flowers in this section differ from those of the preceding on account of the frill-like margins to the standards.

12. Bridesmaid, × × × June 1, 1893 (Wilks, Barr, Veitch).—Rather slender habit; very free-flowering; standards delicate lavender, the lower portion netted with purple; falls white, beautifully netted with bluish-purple.

13. Gazelle (Wilks, Barr).—Sturdy habit, with bold handsome flowers; standards white, heavily suffused with blue; falls white, margined and reticulated with blue. Very showy.

14. Madame Chereau, × × × June 1, 1893 (Wilks, Barr, Veitch).—Vigorous habit and very free-flowering; standards shorter and broader than those of No. 12, white, distinctly frilled and broadly margined with blue; falls stout, white, reticulated and edged with blue.

15. Sussanah (Veitch).—Same as No. 14.

16. Swerti (Barr).—Very similar to No. 14.

IV. Neglecta Varieties.

In this group the standards vary in colour from lavender to blue and purple.

17. Amabilis (Barr).—Strong habit; moderately free-flowering; standards pale blue or lilac, deepening towards the edges; falls broad towards the apex, rich crimson-purple, the basal half netted with purple on a white ground.

18. Augustus (Veitch).—Rather slender habit; standards blue; falls purple, with paler margins.

19. Clarissima (Barr).—Sturdy habit, with stiff spikes of large flowers; standards deep lavender, shaded purple; falls reticulated with purple on a white ground.

20. Cordelia, × × × June 1, 1893 (Barr, Veitch).—Vigorous habit, with large substantial flowers; very floriferous; standards lavender-blue, falls broad deep velvety purple, edged with a paler shade.

21. Du Bois de Milan (Barr).—Rather slender habit; standards broad, pale blue or lavender; falls rather short, rich plum-purple, the lower portion white, beautifully netted with purple.

22. Edina (Barr).—Strong habit; rather shy-flowering; standards lavender-blue; falls purplish-blue.

23. Eugène (Veitch).—Strong habit; free-flowering; standards purple with deeper venations; falls dark purple, shading to maroon.

24. Fairy Queen (Barr, Veitch).—Rather slender habit; standards and falls lavender, heavily bordered and veined with deep bluish-violet.

25. Garrick (Veitch).—Strong habit; rather slender flower-spikes; standards purplish-blue; falls deeper blue.

26. Harlequin Milanais (Barr).—Rather slender habit, with tall flower-spikes; standards lavender; falls long and rather narrow, bluish-purple, and strongly veined. This must not be confused with the true 'Harlequin,' a deep-yellow flower irregularly streaked with black.

27. John de Witte (Veitch).—Sturdy habit; standards mauve, with deeper shadings; falls rich purple, the lower half white, beautifully pencilled with purple.

28. Khedive (Veitch).—Sturdy habit; very free-flowering; standards lavender; falls very pale purple, the basal part veined with light purple on a white ground; beard yellow.

29. Kitty Kingsbury (Barr, Veitch).—Strong habit; very free-flowering, flowers large; standards lavender, falls deep violet-purple; beard rich yellow.

30. Lady Seymour (Barr).—Sturdy habit; rather shy-flowering; standards very delicate lavender; falls lilac-purple, beautifully veined.

31. Louis Van Houtte (Veitch).—Sturdy habit; free-flowering; standards lavender; falls purple, edged with a lighter shade.

32. M. Hardy (Hibberd).—Sturdy habit; free-flowering; standards light blue; falls purple, marked with white.

33. Miss Maggie (Veitch).—Strong habit; exceptionally free-flowering; standards pale lavender; falls purple, edged with a lighter shade.

34. Nationale (Barr, Veitch).—Sturdy habit; very free-flowering; standards deep blue; falls deep plum, lower portion white, veined with plum; beard rich yellow.

35. Othello (Wilks, Veitch).—Same as No. 34.

36. Sultana (Barr).—Strong habit; very free-flowering; standards lavender, with purple shadings; falls rich purple.

37. Topaz (Veitch).—Sturdy habit; rather shy-flowering; standards deep lavender; falls short and broad, deep purple, with a paler margin.

38. Thorbeck (Wilks).—Vigorous habit; free-flowering; standards pale lavender with deeper shadings; falls plum-purple, marked with white; beard yellow.

39. Virginie, × × × June 1, 1893 (Barr, Veitch).—Sturdy habit; very free-flowering; standards large, pale blue; falls long, rich plum-purple, the lower portion white, veined with purple; beard rich yellow. Similar to No. 29.

40. Wagneri, × × × June 1, 1893 (Barr).—Sturdy habit; free-flowering; standards large and handsome, lavender, with deeper shadings; falls purplish-violet, margined with lavender.

V. Pallida Varieties.

41. Pallida, × × × June 11, 1903 (Wilks, Barr, Veitch).—A grand Iris introduced from the Mediterranean region in 1596, and remarkable

for its large lavender standards and broad purplish-lilac falls, the basal portion freely netted with white; beard rich yellow.

42. Albert Victor, × × × June 11, 1903 (Veitch).—Vigorous habit; very free-flowering; flowers unusually large and sweet-scented; standards blue; falls broad blue with a faint suspicion of rose.

43. Cœleste, × × × June 11, 1903 (Barr).—Sturdy habit; free-flowering; standards pale blue; falls deeper blue, veined with soft lavender on the lower half.

44. Dalmatica, × × × June 11, 1903 (Barr, Veitch).—Vigorous habit; very free-flowering; flowers very large and fragrant, lavender, very slightly flushed with rose; the falls a trifle deeper than the standards.

45. Delicata (Veitch).—A pale-flowered form of No. 41.

46. Faust (Veitch).—A very deep-flowered form of No. 51.

47. Khedive, × × × June 1, 1893 (Barr).—Rather slender habit; free-flowering; flowers light lavender or mauve; the falls rather deeper than the standards; beard rich yellow.

48. Lilacina (Barr).—Sturdy habit; moderately free-flowering; flowers rich blue; the basal portion of the falls white, netted with blue.

49. Madame Pacquette, × × × June 11, 1903 (Barr).—Sturdy habit; free-flowering; standards violet-purple; falls rich purple, beautifully veined.

50. Mandraliscoe, × × June 11, 1903 (Barr).—Vigorous habit; very free-flowering; standards blue; falls long and broad, blue, suffused with purple.

51. Queen of May, **A.M.** June 9, 1891 (Wilks, Barr, Veitch).—Sturdy habit; very free-flowering; standards rosy-lilac; falls deep rose, with paler veinings.

52. Rubella (Barr).—Sturdy habit; rather shy-flowering; standards purplish-blue; falls rich purple, the basal part white, netted with purple.

VI. Squalens Varieties.

The members of the Squalens group are remarkable principally for the coppery, bronzy-yellow, bronzy-purple, and fawn-coloured standards.

53. Abdul Aziz (Barr).—Rather slender habit; shy-flowering; standards light purple, suffused and edged with yellow; falls deep purple, veined with white.

54. A. F. Barron (Barr, Veitch).—Rather slender habit; very free-flowering; standards bronzy-yellow; falls rather long, creamy-white, suffused with yellow, netted and heavily tipped with crimson-purple.

55. Arnoldi, × × × June 1, 1893 (Wilks, Barr, Veitch).—Vigorous habit; very free-flowering; standards very large, bronzy-purple, suffused with yellow; falls broad, rich purple, marked with white; beard deep yellow.

56. Beaconsfield, × × × June 1, 1893 (Barr).—Sturdy habit; very free-flowering; standards bronzy-yellow; falls purplish-crimson, edged with yellow.

57. Britannia (Barr).—Sturdy habit; standards cream-white; falls plum-purple, slightly margined with white, the basal half veined with dull purple on a white ground and margined with yellow.

58. Exquisite (Barr).—Sturdy habit; very free-flowering; standards broad, primrose-yellow, suffused with purple; falls light purple, with a conspicuous orange-yellow beard.

59. Greyhound (Barr).—Stiff habit; shy-flowering; standards bronzy-yellow; falls purple, with a deep yellow beard.

60. Hamlet (Wilks).—Same as No. 66.

61. Harrison Weir, × × × June 1, 1893 (Barr).—Sturdy habit; very free-flowering; standards broad, bronzy-yellow; falls purplish-crimson, marked with white.

62. Héricart de Thury (Hibberd).—Vigorous habit; standards lemon-yellow; falls purple, streaked with white.

63. Herodotus, × × June 1, 1893 (Barr).—Rather slender grower; moderately free-flowering; standards rather small, bronzy-yellow, tipped with purple; falls purple, lower portion yellow, veined with purple.

64. Jacquiniana, × × × June 1, 1893 (Wilks, Barr, Veitch).—Vigorous habit; very free-flowering; standards bronzy-purple, speckled with yellow towards the base; falls deep velvety purple, shading to maroon.

65. Lady Jane (Barr).—Vigorous habit; standards purplish-rose; falls purple, heavily veined with white.

66. La Prestieuse, × × × June 1, 1893 (Barr, Veitch).—Vigorous habit; free-flowering; standards bronzy-yellow; falls purplish-maroon.

67. Latifolia (Barr).—Vigorous habit; free-flowering; standards pale lemon, shaded with blue; falls purple, veined with white; beard rich yellow.

68. Lavandulacea (Barr).—Vigorous habit; rather shy-flowering; standards very pale bronzy-yellow; falls broad, soft lavender.

69. Monsieur Chereau, × × × June 1, 1893 (Barr).—Dwarf, sturdy habit; moderately free-flowering; standards dark bronzy-yellow; falls purple, basal portions marked with white and yellow.

70. Mrs. Shaw (Barr).—Vigorous habit; free-flowering; standards bronzy-yellow, suffused with purple; falls long and narrow, purple; beard rich yellow.

71. Murat (Veitch).—A deep-coloured form of No. 61.

72. Phidias (Barr).—Sturdy habit; very free-flowering; standards bronzy-yellow; falls rich velvety-purple, lower portions yellow, beautifully veined with purple.

73. Rebecca (Barr).—Sturdy grower; rather shy-flowering; standards bronzy-yellow; falls deep purple.

74. Shakespeare (Veitch).—Vigorous habit; free-flowering; standards bronzy-yellow, tinged with purple; falls rather narrow, rich purple, marked with white on the basal parts.

75. Salar Jung (Barr).—Rather weak habit; standards bronzy-yellow, flaked and streaked with maroon; falls deep maroon over a white ground.

76. Venusta (Barr).—Vigorous habit; very free-flowering; standards incurving and wavy, bronzy-yellow, splashed with purple; falls deep purple, with conspicuous white veins.

77. Vincent (Barr).—Vigorous habit; standards bronzy-yellow; falls light purple.

78. Walneriana, × × × June 11, 1903 (Barr).—Rather slender habit, with tall flower-spikes; very floriferous; standards bluish-bronze; falls

bluish-violet, lower portion yellow, with brown venations; beard rich yellow.

VII. Variegata Varieties.

The standards in this section are yellow, or nearly so.

79. Abou Hassan (Veitch).—Sturdy habit; very free-flowering; flowers large and shapely; standards bright yellow; falls pale yellow, with brownish-red venations.

80. Aurea (Wilks).—Sturdy grower; very free-flowering; standards and falls sulphur-yellow, suffused with golden yellow.

81. Butterfly (Selfe-Leonard).—Tall, slender habit; exceptionally free-flowering; flowers small; standards yellow; falls white, edged with yellow and veined and marked with purple.

82. Chelles (Wilks).—Sturdy habit; moderately free-flowering; standards deep yellow; falls deep velvety-purple, shaded with yellow on the basal half; beard deep yellow.

83. Dandy (Veitch).—Sturdy habit; free-flowering; standards canary-yellow, paler than those of No. 90; falls rather short and broad, purple, shaded and edged with yellow.

84. Darius, × × × June 11, 1893 (Barr, Veitch).—Vigorous habit; very free-flowering; standards very large, yellow, edged with a deeper shade; falls pale purple or lilac, edged with cream-white; beard rich yellow.

85. Disraeli (Veitch).—Sturdy habit; very free-flowering; standards canary-yellow; falls yellow, with a broad purple margin and conspicuous purple venations.

86. Favourite, × × × June 1, 1893 (Barr).—Rather slender habit; free-flowering; standards pale yellow; falls pale lilac-purple, edged with light yellow. Similar to but paler than No. 84.

87. Gracchus, **F.C.C.** June 9, 1885 (Wilks).—Very sturdy habit; exceptionally free-flowering; standards very broad, pale yellow, splashed with purple; falls spreading, pale yellow, heavily veined and suffused with purple.

88. Hector, × × × June 1, 1893 (Wilks, Barr, Veitch).—Vigorous habit; free-flowering; flowers large; standards light bronzy-yellow; falls maroon-purple, basal portion yellow, with purple venations.

89. John Fraser, × × × June 1, 1893 (Barr).—Sturdy habit; free-flowering; standards broad, canary-yellow; falls purple, edged with yellow.

90. L'Honorable, × × × June 1, 1893 (Barr, Veitch).—Rather slender habit; free-flowering; standards coppery-yellow; falls bronzy-yellow; beard rich yellow.

91. Major, × × × June 1, 1893 (Barr).—Sturdy habit; standards deep yellow; falls purple, basal portion yellow; beard deep yellow.

92. Malvina (Wilks, Barr).—Sturdy habit; standards canary-yellow; falls creamy-white, with conspicuous purple veins and distinctly edged with brownish-purple.

93. Marenco (Barr).—Rather slender habit; moderately free-flowering; standards rich yellow; falls purple, veined with yellow.

94. Mrs. Neubronner, × × × June 11, 1903 (Veitch, Ware).—Strong

habit; exceptionally free-flowering; standards deep yellow, similar to No. 96; falls lemon-yellow, veined with purple; beard rich yellow.

95. Orphée (Barr).—Rather slender habit; standards rich yellow; falls white, beautifully veined with brownish-crimson.

96. Prince of Orange, × × × June 1, 1893 (Wilks, Barr, Veitch).—Dwarf, sturdy habit; very free-flowering; standards broad, deep yellow; falls brownish-purple, the basal portion yellow and veined with brown.

97. Regina (Barr).—Rather slender habit; standards sulphur-yellow; falls purple on a yellow ground.

98. Rigoletto (Wilks, Barr).—Sturdy habit; free-flowering; standards large, rich yellow; falls purplish-brown shaded with yellow and white.

99. William Marshall, × × × June 29, 1894 (R.H.S.).—Sturdy habit; very free-flowering; standards rich yellow touched with bronze; falls brownish-crimson.

VII. Miscellaneous Irises.

100. Flavescens, × × × June 1, 1893 (Wilks, Barr).—A free-growing species indigenous to Eastern Europe and Western Asia. It produces tall handsome spikes of fragrant flowers with sulphur-coloured standards and creamy-white falls, the latter veined with purple on the basal portion.

101. Florentina (Wilks, Hibberd, Barr).—An old-fashioned species, native of Southern Europe, introduced to this country about the end of the fifteenth century. It is of good growth and bears sweet-scented whitish flowers with shaded blue standards and deeper-coloured falls, veined with greenish-yellow.

102. Ochroleuca (Barr).—A vigorous species and one that is happy in moist ground. Flowers rather small, white and yellow.

103. Olbiensis sulphurea grandiflora (Barr).—A dwarf variety with sweet-scented flowers; standards very pale lemon-yellow; falls deeper shade of the same colour.

104. Pumila atroviolacea (Hibberd).—A delightful variety with bluish-purple flowers, produced very early in the season. A good rock-garden plant.

105. Pumila purpurea minor (Barr).—Another dwarf early-flowering variety, suitable for the rock garden. Flowers fragrant and freely produced; standards violet-blue, lower portion mottled with brown; falls purple, basal half-reticulated with brown on a white ground.

106. Sambucina (Barr).—This was introduced from the South of Europe in 1758, and derives its name from the scent of its flowers resembling that of Elder-flower. It is of strong growth and free-flowering; standards bronzy-purple; falls rosy-purple with a yellow beard. A continuous bloomer.

107. Sibirica (Barr, Staples).—A well-known species, introduced from Siberia towards the close of the fifteenth century. It is of upright slender habit, with narrow foliage and hollow flower-stems. It is well suited for moist ground in a rather sunny position. Flowers small, freely produced, rich blue; falls beautifully pencilled with yellow and violet; leaves long and narrow.

108. Sibirica acuta (Barr).—A dwarf form of No. 107.

109. Sibirica lactea, × × × June 11, 1903 (Barr).—This differs from the type by reason of its standards being white and falls cream-white.

REPORT ON POPPIES AT CHISWICK, 1903.

A COLLECTION of 125 stocks of Poppies was received for trial, of which 58 were sown on a raised south border, 44 on a rather low north border, and 23 on a west border, in rows 14 inches apart. As the seedlings grew they were thinned out to about 3 inches between each plant. Those sown on the first and last named ground grew well, flowered profusely, and were greatly admired by visitors to the gardens, while those on the north aspect failed completely, probably owing to the rather damp situation and very cold, wet, and frosty weather experienced just as the seedlings were piercing the ground. Poppies are delightful flowers for garden decoration; their great drawback is that the flowers of the single varieties are so fleeting; but if occasional sowings can be made a gorgeous display of flowers can be maintained over a long period. The Floral Committee examined the collection and recommended awards to deserving varieties.

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A.M. = Award of Merit.
× × × = Highly Commended.

I. FLOWERS DOUBLE AND SEMI-DOUBLE.

This group contains what are termed Cardinal, Japanese Pompones, Murselli fl. pl., Carnation, Pæony and Ranunculus flowered, &c., all of which are forms of *Papaver Rhœas* and *P. somniferum*.

1. Cardinal, × × × July 27, 1898 (Dobbie, Watkins & Simpson, Veitch, Barr).—Height 16–20 inches; upright sturdy habit; very free-flowering; flowers 4–5 inches across, perfectly double, petals deeply forked, scarlet, marked with white on the lower half. Received as 'Cardinal Scarlet,' 'Double Dwarf Cardinal,' and 'The Cardinal.'

2. Cardinal, Blush Victoria, × × × July 15, 1903, (Dobbie, Watkins & Simpson).—Height and habit similar to No. 1. Flowers large, pale pink, passing to rose-pink with age. Received as 'New Double Victoria,' and 'Double Dwarf Rose-pink.'

3. Cardinal Chamois (Dobbie, Watkins & Simpson).—A lovely pale salmon form of No. 1.

4. Cardinal, copper-rose (Dobbie).—Height 2 feet; sturdy habit; moderately free-flowering; flowers large, rosy-crimson, with laciniated petals.

5. Cardinal, white, **A.M.** July 15, 1903 (Dobbie).—Height and habit similar to No. 1. Pure white Hollyhock-shaped flowers with fringed petals. Received also under the name of 'Cardinal May Campbell.'

6. Carnation, ash-grey on crimson ground (Dobbie).—Stock not fixed.

7. Carnation, crimson (Dobbie).—Height 2 feet 6 inches; very strong habit; flowers large, rich crimson, touched with maroon; petals beautifully fringed.

8. Carnation, lilac (Dobbie).—Height and habit similar to No. 7. Flowers lilac or heliotrope, with much-cut petals.

9. Carnation, rose (Dobbie).—Height 2 feet; upright habit; moderately free-flowering; flowers 4½ inches across, bright rose, deepening in colour towards the base of the petals.

10. Carnation, rose on crimson ground (Dobbie).—Height and habit similar to No. 9. Flowers large, rosy-crimson, passing to rose and pale pink; petals deeply fringed.

11. Carnation, scarlet (Dobbie).—Height and habit similar to No. 9. Flowers bright scarlet with deeply cut petals.

12. Carnation, scarlet on dark ground (Dobbie).—Similar to No. 11.

13. Carnation, white (Dobbie).—Habit same as No. 7. Flowers large, pure white, with laciniated petals.

14. French mixed (Veitch).—Height 2 feet 6 inches; branching habit; free-flowering; flowers 3 inches across, mostly double and nearly all crimson or scarlet in colour.

15. Irresistible (Barr).—Height 2 feet 6 inches; upright, non-branching habit; moderately free-flowering; flowers 5 inches across, outer petals broad, inner ones narrow and of a lovely shade of rose pink.

16. Japanese Pompones (Dobbie).—Very similar to No. 14.

17. Japanese Pompones mixed (Dobbie).—Similar to No. 16, only taller in growth.

18. Murselli fl. pl. (Dobbie).—Height 2 feet; upright, sturdy habit; beautifully shaped Carnation-like white flowers, tipped with purple.

19. Murselli fl. pl., American Flag, × × × July 15, 1903 (Dobbie).—Height and habit same as No. 18. Flowers large, rather flat, white ground, freely streaked and edged with purple. A continuous bloomer.

20. Murselli fl. pl. The Mikado (Veitch, Dobbie).—Height 3 feet 6 inches; vigorous habit; free-flowering; flowers large, rosy-scarlet, passing to purple with age. Petals deeply cut.

21. Pæony-flowered (twenty-one varieties) (Dobbie).—A very fine selection, in which the flowers are large and shapely, and true to colour.

22. Ranunculus-flowered, crimson (Dobbie).—Similar to Double French. Height 2–3 feet; rather slender, branching habit; free-flowering; flowers double and semi-double.

23. Ranunculus-flowered, crimson and white (Dobbie).—This differs from the preceding by reason of the flowers being distinctly edged with white like a Picotee.

24. Ranunculus-flowered, rose (Dobbie).—Habit similar to No. 22. Flowers semi-double, warm rose.

25. Ranunculus-flowered, scarlet (Dobbie).—Habit same as No. 22. Flowers bright scarlet, passing to crimson.

26. Ranunculus-flowered, scarlet and white (Dobbie).—Habit same as No. 22. Flowers semi-double, scarlet, edged with white.

27. Ranunculus-flowered, slate-blue (Dobbie).—Habit same a No. 22. Flowers bluish-purple.

28. Ranunculus-flowered, white (Dobbie).—Habit same as No. 22. Flowers semi-double, pure white.

29. Rawson's fringed (Barr).—Height 2 feet 6 inches; upright habit; free-flowering; flowers rosy-scarlet and white; petals deeply fringed.

30. Scarlet King (Barr).—Closely allied to the Cardinal section. Height 2 feet 6 inches; upright, non-branching habit; free-flowering; flowers 4–5 inches across rich scarlet; petals heavily fringed.

31. White Colossal, × × × July 15, 1903 (Barr).—Height 2 feet 6 inches; upright, non-branching habit; free-flowering; flowers 5 inches across, pure white.

II. Flowers Single.

32. Arenarium, × × × July 15, 1903 (Dobbie).—Height 15–18 inches; slender habit; leaves glaucous and deeply cut; very free-flowering; flowers nearly 4 inches across, bright scarlet, with a black blotch at the base of each petal. A continuous bloomer.

33. Danebrog, × × × July 9, 1889 (Dobbie, Barr).—Height 2 feet 6 inches; upright habit; very free-flowering; flowers large, scarlet, heavily blotched with white; petals beautifully fringed, some much more so than others. Also received under the name of 'Empress of China.'

34. Glaucum, **A.M.** July 15, 1903 (Barr, Dobbie, Veitch).—Height 1 foot to 18 inches; branching habit; very free-flowering; flowers 4 inches across, crimson, with a black blotch at the base of each petal.

35. Lævigatum (Dobbie).—Same as No. 39.

36. Maid of the Mist (Barr).—Height 3 feet; non-branching habit; white cup-shaped flowers with deeply fringed petals.

37. Mephisto, **A.M.** July 15, 1903 (Barr, Dobbie).—Height 3 feet 6 inches; vigorously upright habit; free-flowering; flowers 4–5 inches across, crimson, heavily blotched with black; petals deeply fringed.

38. Mephisto Rose (Dobbie).—Not quite so vigorous as No. 37. Flowers rose, with deeply cut petals.

39. Pavonium (Veitch).—Height 2 feet 6 inches; branching habit; flowers 4½ inches across, crimson, with a white zone near the black base.

40. Pavonium grandiflorum (Dobbie).—Plants of taller and more diffuse habit than No. 39. Flowers orange-red, with a purplish-red base surrounded by a deep indigo-blue zone.

41. Rhœas, 'The Shirley,' **F.C.C.** July 2, 1901 (Watkins & Simpson).—A remarkably good strain, originally selected by the Rev. W. Wilks at Shirley, Croydon, from the common field Poppy. The flowers are large and shapely, and for single Poppies very enduring. The colours vary from white through shades of pink, rose, salmon, scarlet, crimson, &c. They should have no sign of black either at the base of the petals or in the anthers and pollen, which should always be golden-yellow or white.

42. Rhœas umbrosum (Dobbie, Barr).—Height 18 inches; branching habit; free-flowering; flowers deep scarlet, each petal blotched with black. Also received as 'Single Scarlet Caucasian.'

43. The Bride (Barr, Veitch, Dobbie).—Height 3–4 feet; upright, non-branching habit; flowers large, cup-shaped, pure white.

REPORT ON PEAS AT CHISWICK, 1903.

EIGHTY-FOUR stocks of Peas were received for trial in the Gardens, and all were sown on March 13 on ground that had been ridge-trenched and well manured during the previous winter. All the stocks were thinly sown, and the majority germinated well, and made sturdy growth, free from any insect or fungoid pests. The Committee met on two occasions to examine the stocks, viz. July 3 and 14.

F.C.C.=First-class Certificate.
A.M.=Award of Merit.

1. Abundant (Laxton).—Height 18 inches. Haulm and pods deep green; pods in pairs, short, thick, straight, averaging six large pale-green sweet peas in a pod. Good crop. Ready for use July 13. Seeds wrinkled.

2. Acquisition (J. Veitch).—Height 2½ feet. Haulm and pods dark green; pods in pairs, long, broad, straight, averaging six very large deep-green peas in a pod. Heavy crop. Ready for use July 14. Seeds wrinkled.

3. American Wonder (Sutton).—This variety is too well known to need any description, and is now superseded by such excellent dwarf varieties as 'Harbinger' and 'Little Marvel.'

4. Aristocrat, **A.M.** July 14, 1903 (Sharpe).—Height 4 feet. Haulm and pods very dark green; pods in pairs, long, straight, handsome, averaging nine large deep-green and very sweet peas in a pod. Great crop on very sturdy haulm. Ready for use July 12. Seeds wrinkled.

5. Beatrice Harrison (Harrison).—Height 3 feet. Haulm and pods dark green; pods in pairs, long, broad, straight, averaging seven large pale-green sweet peas in a pod. Heavy crop. Ready for use July 7. Seeds wrinkled.

6. Best of All (Sutton).—See Vol. XXVI., page 278. Ready for use July 12.

7. Boston Unrivalled, **A.M.** July 14, 1896 (Barr).—Height 4½ feet. Haulm and pods pale green; pods in pairs, long, thick, and nearly straight, averaging seven large sweet peas in each. Very heavy crop. Ready July 11. Seeds wrinkled.

8. Carter's Seedling No. 1 (Carter).—Height 2 feet. Haulm and pods deep green; pods single, short, straight, averaging five large dark-green peas in a pod. Good crop. Ready for use July 11. Seeds wrinkled.

9. Carter's Seedling No. 2. (Carter).—Height 1 foot. Haulm and pods dark green; pods usually single, short, thick, straight, averaging four pale-green sweet peas in a pod. Good crop. Ready for use July 3. Seeds wrinkled.

10. Carter's Seedling No. 3. (Carter).—Height 18 inches. Haulm dark green; pods paler, single, short, thick, straight, averaging five large

whitish sweet peas in a pod. Good crop. Ready for use July 13. Seeds wrinkled.

11. Carter's Seedling No. 4. (Carter).—Height 2 feet. Haulm deep green ; pods paler, single, long, straight, thick, averaging five large deep-green and very sweet peas in a pod. Heavy crop. Ready for use July 14. Seeds wrinkled.

12. Carter's Seedling No. 5. (Carter).—Height 2 feet. Haulm and pods pale green ; pods in pairs, long, thick, straight, averaging six large pale-green peas in a pod. Good crop. Ready for use July 11. Seeds wrinkled.

13. Carter's Forcing (Carter).—Height 1 foot. Haulm and pods dark green ; pods single, long, broad, thick, averaging five very large and very sweet peas in a pod. Heavy crop. Ready for use July 3. Seeds wrinkled.

14. Centenary, **A.M.** July 5, 1901 (Sutton).—See Vol., XXVI., page 278. This fine variety well maintained its form, and is equally valuable for table or exhibition. Ready for use July 11.

15. Coleman's Exquisite (Coleman).—Height 4 feet. Haulm and pods deep green ; pods in pairs, long, broad, straight, averaging nine large pale-green peas in a pod. Good crop. Ready for use July 10. Seeds wrinkled.

16. Coleman's Favourite, **A.M.** July 14, 1903 (Coleman).—Height 3½ feet. Haulm and pods very dark green ; pods in pairs, long, broad, straight, and pointed, averaging seven large deep-green and very sweet peas in a pod. Heavy crop borne on sturdy haulm. Ready for use July 10. Seeds wrinkled.

17. Commander (Daniel).—Height 2 feet. Haulm and pods dark green ; pods in pairs, long, thick, straight, averaging six large deep-green peas in a pod. Good crop. Ready for use July 14. Seeds wrinkled.

18. Commonwealth (Carter).—See Vol. XXVII., page 205. Very like an improved form of 'Stratagem.' Ready for use July 10.

19. Continuity, **A.M.** July 9, 1898 (Sutton).—See Vol. XXVI., page 279. Ready for use July 13.

20. Daisy, **F.C.C.** July 11, 1902 (Carter).—See Vol. XXVI., page 277. Ready for use July 8.

21. Diamond (Carter).—Height 18 inches. Haulm dark green ; pods paler, single, short, thick, nearly straight, averaging five large whitish sweet peas in a pod. Heavy crop. Ready for use July 3. Seeds wrinkled.

22. Distinction (Daniel).—Height 4 feet. Haulm and pods dark green ; pods single, curved, long, averaging seven large deep-green sweet peas in a pod. Good crop. Ready for use July 3. Seeds wrinkled.

23. Davis Harrison (Harrison).—Height 15 inches. Haulm and pods deep green ; pods usually single, short, thick, straight, averaging five large pale-green peas in a pod. Moderate crop. Ready for use July 3. Seeds wrinkled.

24. Duke of Rutland (Harrison).—Height 6 feet. Haulm and pods dark green ; pods usually single, long, slightly curved, averaging six large deep-green peas in a pod. Heavy crop. Ready for use July 5. Seeds wrinkled.

25. Duchess of York, **A.M.** June 20, 1901 (Sutton).—See Vol. XXVI., page 276. Ready for use July 3.

26. Dwarf Defiance, **A.M.** July 5, 1901 (Sutton).—See Vol. XXVI., page 277. Ready for use July 3.

27. Dwarf Monarch (Carter).—This variety requires further selection.

28. Dwarf Mammoth (Sutton).—See Vol. XXVII., page 205. Ready for use July 14.

29. Early Daisy (Carter).—An early form of No. 20. Ready for use July 3.

30. Early Favourite (Carter).—Height 18 inches. Haulm and pods dark green; pods single, short, thick, straight, averaging seven large deep-green peas in a pod. Heavy crop. Ready for use July 2. Seeds wrinkled.

31. Early Marrowfat (Sutton).—Height 5 feet. Haulm and pods deep green; pods in pairs, long, broad, nearly straight, averaging seven large pale-green peas in a pod. Heavy crop. Ready for use July 3. Seeds wrinkled.

32. Essex Hero (Hobday).—Height 5½ feet. Haulm and pods dark green; pods in pairs, moderate length, straight, thick, averaging six large deep-green peas in a pod. Heavy crop on sturdy haulm. Ready for use July 14. Seeds wrinkled. A promising variety.

33, 34. Eureka (Sutton, Barr).—See Vol. XXVI., page 279. Ready for use July 14.

35. Excelsior (Sutton).—See Vol. XXVI., page 276. Ready for use July 5.

36. Exhibition Marrowfat (Sutton).—See Vol. XXVI., page 276. Ready for use July 14.

37. Extra Early Edible-podded (Barr).—Height 4 feet. Haulm deep green; pods pale, long, and very broad. This pea is not very good unless cooked early, almost before the seeds are formed. Then the pods are very tender, and of good flavour. Ready for use July 3.

38. Feltham Gem, **A.M.** July 14, 1903 (J. Veitch).—Height 2 feet. Haulm and pods dark green; pods in pairs, long, broad, straight, handsome, averaging six large deep-green sweet peas in a pod. Very heavy crop. Ready for use July 14. Seeds wrinkled.

39. Gleaner, **A.M.** July 3, 1903 (J. Veitch).—Height 5 feet. Haulm and pods very dark green; pods usually single, long, slightly curved, averaging ten large deep-green peas in a pod. Heavy crop on robust haulm. Ready for use July 3. Seeds wrinkled.

40. Glory of Devon, **A.M.** July 11, 1899 (R. Veitch).—See Vol. XXVII., page 206. Ready for use July 14.

41. Goldfinder (R. Veitch).—This is a good selection of 'Ne Plus Ultra.' Ready for use July 14.

42. Grand Monarque (Sharpe).—This is a form of 'Gradus.' Ready for use July 9.

43. Green Gem (Sutton).—See Vol. XXVI., page 275. Ready for use July 3.

44. Ideal, **F.C.C.** July 3, 1903 (Sutton).—See Vol. XXVI., page 276. Ready for use July 3. A very fine variety.

45. Improved American Wonder (Carter).—Same as No. 3.

46. Improved Early (J. Veitch).—Height 4½ feet. Haulm and pods pale green; pods in pairs, averaging six large pale-green peas in a pod. Heavy crop. Ready for use July 1. Seeds wrinkled.

47. Improved Marrow (J. Veitch).—Height 5 feet. Haulm and pods deep green; pods long, curved, in pairs, averaging eight large pale-green sweet peas in a pod. Heavy crop. Ready for use July 13. Seeds wrinkled.

48. Improved Monarch, **F.C.C.** July 14, 1903 (Sharpe).—A very fine and greatly improved form of 'Monarch,' being longer in the pod, and a tremendous cropper. Height 5 feet. Ready for use July 14. Seeds wrinkled.

49. Kaiser, **A.M.** July 14, 1903 (Webb).—Height 4 feet. Haulm and pods dark green; pods in pairs, long, broad, straight, averaging nine very large bright-green peas in a pod. Heavy crop on very sturdy haulm. Ready for use July 11. Seeds wrinkled.

50. King of the Earlies (Carter).—See Vol. XXVI., page 274. This name is misleading, as the variety is not early, being mid-season. Ready for use July 13.

51. King Edward VII. (Goody).—Height 20 inches. Haulm and pods dark green; pods in pairs, short, thick, straight, not well filled, averaging four deep-green sweet peas in a pod. Light crop. Seeds wrinkled. There are several peas named 'King Edward' distinct from the above. Ready for use July 10.

52. King of the Dwarfs (Sutton).—Height 1 foot. Haulm and pods deep green; pods single, short, thick, straight, averaging five bright-green sweet peas in a pod. Light crop. Ready for use July 8. Seeds wrinkled.

53, 54. Late Queen, **A.M.** July 10, 1900 (Sutton, Barr).—See Vol. XXVI., page 279. Ready for use July 14.

55, 56. Little Marvel, **A.M.** July 11, 1902 (Sutton, Carter).—See Vol. XXVI., page 279. Ready for use July 1.

57. Lord Roberts, **A.M.** July 18, 1902 (Sutton).—See Vol. XXVII., page 206. Ready for use July 13. This again proved to be an excellent variety

58. Majestic (Carter).—Height 3 feet. Haulm and pods dark green; pods single, long, curved, handsome, averaging eight large deep-green sweet peas in a pod. Heavy crop. Ready for use July 13. Seeds wrinkled.

59. Masterpiece (Sutton).—See Vol. XXVI., page 278. Ready for use July 11.

60. Nonpareil Marrow (Sutton).—See Vol. XXVI., page 277. Ready for use July 8.

61. Nonsuch (Sutton).—See Vol. XXVII., page 207. Ready for use July 3.

62. Peerless, **F.C.C.** July 14, 1903 (Sutton).—See Vol. XXVI., page 278. Ready for use July 13. This was one of the finest peas in the collection, and produced an enormous crop.

63. Perpetual (Sutton).—See Vol. XXVI., page 279. Ready for use July 14.

64. Pilot, **A.M.** July 3, 1903 (Hurst).—Height 4½ feet. Haulm and pods light green; pods in pairs, long, thick, nearly straight, averaging

eight large deep-green sweet peas in a pod. Very heavy crop. Ready for use July 3. Seeds wrinkled.

65. Prolific, **A.M.** July 18, 1902 (Barr).—See Vol. XXVI., page 279. Ready for use July 7.

66. Progression, **A.M.** July 14, 1903 (J. Veitch).—Height 6 feet. Haulm and pods dark green; pods in pairs, long, broad, straight, averaging eight large deep-green sweet peas in a pod. Heavy crop on sturdy haulm. Ready for use July 13. Seeds wrinkled.

67. Pride of the Market, **F.C.C.** July 22, 1881 (Carter).—Height 2 feet. Haulm and pods very dark green; pods single, long, thick, straight, averaging seven large deep-green sweet peas in a pod. Heavy crop. Ready for use July 9. Seeds wrinkled.

68. Profit (Laxton).—Height 4 feet. Haulm and pods light green; pods single, moderately long, thick, straight, averaging five large pale-green peas in a pod. Good crop. Ready for use July 14. Seeds wrinkled.

69. Prested Hall Dwarf Marrow (Hurst).—Height 2 feet. Haulm dark green; pods pale, in pairs, short, broad, thick, straight, averaging five whitish sweet peas in a pod. Ready for use July 3. Seeds wrinkled.

70. Rivenhall Wonder, **A.M.** July 14, 1903 (Cooper, Tabor).—Height 2½ feet. Haulm and pods dark green; pods in pairs, long, thick, straight, averaging seven large light-green sweet peas in a pod on robust haulm. Heavy crop. Ready for use July 14. Seeds wrinkled.

71. Roberts Favourite (Matthews).—Height 3 feet. Haulm and pods deep green; pods single, short, thick, curved, averaging five dark-green sweet peas in a pod. Light crop. Ready for use July 13. Seeds wrinkled.

72. Royal Salute (Hurst).—See Vol. XXVII., page 207. Ready for use July 11.

73. Sherwood Forest, **A.M.** July 14, 1903 (Hurst).—Height 6 feet. Haulm and pods dark green; pods in pairs, long, thick, nearly straight, averaging nine large deep-green peas in a pod. Heavy crop on sturdy haulm. Ready for use July 14. Seeds wrinkled.

74. Sir J. T. D. Llewelyn (Hall).—Height 3 feet. Haulm and pods dark green; pods usually single, only moderately filled with deep-green peas. Light crop. Ready for use July 8. Seeds wrinkled.

75. Stanley (Carter).—Height 18 inches. Haulm and pods dark green; pods single, short, thick, straight, averaging five large pale-green peas in a pod. Heavy crop. Ready for use July 3. Seeds wrinkled.

76. Stratagem, **F.C.C.** July 7, 1882 (Carter).—See Vol. XXVI., page 277. Ready for use July 3.

77. The Feltham (J. Veitch).—Height 2 feet. Haulm and pods very dark green; pods single, long, thick, straight, averaging six large deep-green peas in a pod. Heavy crop. Ready for use July 11. Seeds wrinkled.

78. The Herald (Barr).—Height 18 inches. Haulm and pods deep green; pods short, thick, straight, in pairs, averaging four large pale-green peas in a pod. Moderate crop. Ready for use July 5. Seeds wrinkled.

79. Universal (Sutton).—Height 18 inches. Haulm and pods dark green; pods single, short, thick, straight, averaging five large deep-green sweet peas in a pod. Heavy crop. Ready for use July 10. Seeds wrinkled.

80. Unique, **F.C.C.** 1872 (Laxton).—Height 18 inches. Haulm and

pods dark green ; pods single, short, thick, straight, averaging seven bright-green peas in a pod. Heavy crop. Ready for use July 14. Seeds wrinkled.

81. Viceroy (Sharpe).—Height $3\frac{1}{2}$ feet. Haulm and pods very dark green ; pods in pairs, long, broad, slightly curved, averaging seven large deep-green peas in a pod. Ready for use July 8. Seeds wrinkled.

82. Victor Marrowfat (Carter).—Height 1 foot. Haulm and pods dark green ; pods single, short, thick, straight, averaging four large deep-green peas in a pod. Heavy crop. Ready for use July 4. Seeds wrinkled.

83. Western Express **A.M.**, July 11, 1902 (R. Veitch).—See Vol. XXVII., page 208. Ready for use July 13.

84. Witham Wonder (Cooper, Tabor).—Height 2 feet. Haulm and pods deep green ; pods in pairs, short, thick, straight, averaging six large bright-green peas in a pod. Heavy crop on sturdy haulm. Ready for use July 8. Seeds wrinkled.

REPORT ON BEANS AT CHISWICK, 1903.

A LARGE collection of Dwarf and Climbing French Beans and Scarlet Runner Beans were sown early in May, the Dwarf section being sown on a warm west border, and all of the Runner type on a large open quarter, eight feet between the rows, the ground having been ridge-trenched and well manured the previous winter. Some of the stocks failed to germinate, and all the Climbing French Beans suffered from the frosts in June, while the Scarlet Runner section were uninjured, growing vigorously, and bearing heavy crops. The Fruit and Vegetable Committee examined the whole collection on August 24.

F.C.C. = First-class Certificate.
A.M. = Award of Merit.

1. Canadian Champion (R. Veitch).—Very dwarf; foliage moderate; pods nearly straight, round in shape, thick, and fleshy. Heavy crop. Seeds dark brown. Rather late.

2. Canadian Wonder, **F.C.C.** September 1, 1903 (J. Veitch, Sutton, Dobbie, Sharpe, A. Dean).—Rather tall; foliage large; pods long, straight, handsome. Great crop. Seeds dark purple. Mid-season. This is probably the finest Dwarf French Bean in cultivation, and it is extraordinary that no previous award had been given it.

3. Chevrier's Green (J. Veitch).—This variety resembles 'Ever-bearing' in growth and pods, but the seeds are distinct, being a beautiful sea-green, and, like 'Ever-bearing,' the season was too wet and cold for it.

4. Dwarf Centurion (R. Veitch).—Very dwarf; foliage moderate; pods long, curved, round, and fleshy. Good crop. Seeds dun. Late.

5. Dwarf Sugar (Sutton).—Rather tall; foliage large; pods long, nearly round, straight, and very fleshy. Good crop. Seeds dun, speckled with purple. Mid-season.

6. Early Favourite, **A.M.** April 27, 1897 (J. Veitch).—Very dwarf; foliage moderate; pods long, broad, straight, handsome. Heavy crop. Seeds speckled purple. A very early variety.

7. Early Perfection (R. Veitch).—Dwarf; foliage moderate; pods of medium length, straight, broad, and fleshy. Very heavy crop. Seeds dun. Early.

8. Emperor William, **A.M.** April 27, 1897 (J. Veitch).—This variety germinated badly and suffered from the cold. Seeds white.

9. Ever-bearing, **A.M.** July 25, 1899 (Sutton, J. Veitch).—This variety also suffered from the cold, and requires a warmer summer. This is an excellent and prolific Bean. Seeds white.

10. First Crop Wax-pod (R. Veitch).—Very dwarf; foliage moderate; pods long, curved, broad, and of a beautiful golden colour. Good crop. Seeds black. Very early.

11. Goliath (A. Dean).—Very dwarf; foliage small; pods long, broad,

nearly straight, and a continuous bearer. Heavy crop. Seeds black. Mid-season.

12. Golden Wax-pod, **A.M.** April 27, 1897 (Barr).—Very similar in growth and pods to No. 10, but the seeds are dark purple. Very early.

13. Ilsenberg (J. Veitch).—Failed to germinate.

14. Incomparable (Daniels).—Very dwarf; foliage small; pods of medium length, straight, of good shape. Heavy crop, and a continuous bearer. Seeds dark brown. Mid-season.

15. Klondyke Golden-podded (R. Veitch).—Exactly the same as No. 10 in growth and pods, but the seeds are distinct, being white, speckled with brown. Good crop. Very early.

16. Kingston Gem, **A.M.** September 1, 1903 (A. Dean).—Very dwarf; foliage moderate; pods long, broad, straight, handsome. Very heavy crop, and a continuous bearer. Seeds dun. Early.

17. Leicester Wonder (Harrison).—Failed to germinate. Seeds very large, white, speckled with purple.

18. Magnum Bonum (Sutton).—Failed to germinate. Seeds exactly the same as No. 17.

19. Ne Plus Ultra, **A.M.** July 25, 1899 (Sutton, J. Veitch).—Dwarf; foliage moderate; pods long, nearly straight, broad, and fleshy. Heavy crop. Seeds dun. Early.

20. Negro Long-pod (J. Veitch).—Rather tall; foliage large; pods long, thin, curved. Heavy crop, and a continuous bearer. Seeds black. Mid-season.

21. New Stringless (Barr).—Same as No. 1.

22. Osborn's Forcing, **F.C.C.** August 5, 1873 (J. Veitch).—Very dwarf; foliage small; pods short, thick, straight. Good crop. Seeds purple, speckled with dun. Early.

23. Perfection, **A.M.** July 25, 1899 (Sutton).—The same in growth, pods, and foliage as No. 1, but distinct in the seeds, which are brown, speckled with white.

24. Pale Dun (J. Veitch).—Dwarf; foliage moderate; pods of medium length, broad, nearly straight. Heavy crop, and a continuous bearer. Seeds pale dun. Early.

25. Plentiful (Sutton).—Very dwarf; foliage medium; pods long, very broad, almost like a Scarlet Runner, straight. Very heavy crop. Seeds dun. Early.

26. Progress, **A.M.** July 25, 1899 (J. Veitch).—Rather tall; foliage large; pods long, broad, straight, handsome. Heavy crop, and a continuous bearer. Seeds purple, speckled with dun. Mid-season.

27. Reliance, **A.M.** September 1, 1903 (Sutton).—Very dwarf; foliage small; pods long, thin, straight, handsome. Very heavy crop, and a continuous bearer. Seeds dun. Early.

28. Superb Forcing (J. Veitch).—Failed to germinate.

29. Surrey Prolific, **A.M.** August 13, 1901 (A. Dean). Very dwarf; foliage moderate; pods long, straight, handsome. Heavy crop. Seeds dun. Early

30. Smythe's Fawn, **A.M.** August 13, 1901 (A. Dean).—Dwarf; foliage

medium ; pods long, broad, nearly straight. Heavy crop, and a continuous bearer. Seeds light dun. Mid-season.

31. Smythe's Hybrid (J. Veitch).—Requires more selection, some of the plants having white and others pink flowers. Seeds black.

32. Syon House (J. Veitch).—Dwarf ; foliage small ; pods moderate length and speckled with red, straight. Heavy crop. Seeds pale dun, spotted with purple. Early.

33. Triumph (Sutton).—Very dwarf ; foliage small and compact ; pods long, broad, straight. Very heavy crop. Seeds deep bronze. Early.

34. Western Marvel Stringless (R. Veitch).—Very similar in foliage, pods, and seeds to No. 1.

35. Williams' Earliest of All (Nutting).—Very dwarf ; foliage moderate ; pods long, broad, straight, handsome. Heavy crop. Seeds purple, speckled with dun. Early.

36. Wythes' Early, **A.M.** September 1, 1903 (Wythes).—Rather tall ; foliage moderate ; pods long, straight, speckled with red. Very heavy crop. Seeds dun, speckled with purple. Early. A greatly improved form of 'Syon House.'

37. Wythes' Early Prolific (Wythes).—Very dwarf ; foliage small ; pods short, broad, speckled with red. Heavy crop. Seeds purple, speckled with dun. Very early.

38. Wythes' Progress (Wythes).—Tall ; foliage large ; pods moderate length, straight. Good crop, a late and continuous bearer. Seeds dull brown, speckled with dun.

39. Wythes' Seedling (Wythes).—Very similar to No. 1.

Climbing French Beans.

1. Abundance (Sutton).—Foliage large ; pods 9 inches long, broad, straight, in clusters of four. Light crop. Seeds white.

2. Cambria Runner (R. Veitch).—A Golden Wax-pod ; foliage moderate in size ; pods 5 inches long, straight, handsome, in clusters of three. Light crop. Seeds white and nearly round. This variety did not grow well, and suffered from the cold.

3. Climbing French (Kent).—Did not germinate.

4. Earliest of All (Sutton).—Foliage rather large ; pods 5 to 6 inches long, straight, round, thick and fleshy, in clusters of five. Very heavy crop. Seeds white.

5. Early Golden Cluster (Barr).—This variety germinated and grew well, but none of the flowers set. Seeds white.

6. Epicure (Sutton).—Foliage moderate in size ; pods 6 to 7 inches long, straight, handsome, in clusters of three. Light crop. Seeds dun.

7. Erfurt Earliest Giant Advance (Heinemann).—Foliage large ; pods 10 inches long, straight, broad, handsome, in clusters of four. Light crop. Seeds white. The seeds did not germinate well, and the plant suffered from the cold.

8. Excelsior (Sutton).—Foliage of medium size ; pods 10 inches long, straight, and very handsome, in clusters of three. Good crop. Seeds purple. One of the best of this type.

9. Fill-basket (Sydenham).—Same as No. 1.

10. Kaiser (R. Veitch).—This variety did not set any of its flowers, and suffered from the cold. Seeds small, white.

11. King of the Stringless (R. Dean).—Same as No. 2 .

12. Lightning (Barr).—Same as No. 4.

13. Princess of Wales (Sutton).—Foliage of medium size; pods 9 inches long, straight, handsome, in clusters of two to four. Heavy crop. Seeds dark brown. A fine variety.

14. Tall Sugar (Sutton).—A very tall-growing variety, with large foliage; pods 9 to 10 inches long, straight, handsome, in clusters of three to four. Good crop. Seeds white. One of the earliest.

15. Tender and True, **F.C.C.** September 3, 1891 (Sutton).—Foliage of moderate size; pods 7 to 9 inches long, straight, handsome, in clusters of four. Good crop. Seeds purple.

16. Veitch's Climbing, **F.C.C.** September 25, 1894 (R. Veitch).—Very similar in all respects to No. 15.

Scarlet-Runner Beans.

1. Best of All, **A.M.** September 1, 1903 (Sutton).—Flowers scarlet; pods 11 to 12 inches long, straight, broad, handsome, in clusters of five to six. Very heavy crop. Seeds dun, speckled with black. A very fine variety.

2. Champion, **A.M.** September 1, 1903 (Dobbie).—Flowers scarlet; pods 11 to 13 inches long, straight, broad, handsome, in clusters of five. Very heavy crop. Seeds purple, speckled with black. Another excellent variety.

3. Dobbie's Black-seeded (Dobbie).—Flowers scarlet; pods 7 inches long, curved, broad, in clusters of five. Very heavy crop. A black-seeded form of the old Scarlet Runner.

4. Giantess (Barr).—Flowers scarlet and white; pods 10 to 12 inches long, broad, straight, handsome, in clusters of five to six. Heavy crop. Seeds pale dun, speckled with brown. A good selection of the old 'Painted Lady.'

5. Peter the Great (R. Veitch).—Flowers white; pods 9 inches long, broad, straight, in clusters of three to five. Very heavy crop. Seeds white. Very similar to 'Czar.'

6. Prize-winner, **F.C.C.** September 20, 1892 (Sutton).—Flowers scarlet; pods 10 to 13 inches long, broad, usually curved, in clusters of six. Very heavy crop. Seeds light purple, speckled with black.

7. Selected Scarlet Runner (Crooke).—Flowers scarlet; pods 8 to 9 inches long, straight, broad, in clusters of four. Seeds pale purple, speckled with black.

8. Unnamed Black-seeded (Appleby).—Same as No. 3.

REPORT ON VEGETABLE MARROWS AT CHISWICK, 1903.

TWENTY-EIGHT stocks of Vegetable Marrows were received for trial in the Gardens, all of which were sown in gentle heat in April, and after being gradually hardened all were planted out early in June on good soil well enriched with rotten manure. Most of the stocks suffered from cold and wet, still all grew and cropped well towards the end of the summer. The mistake is too often made of eating Marrows when too large. If cut while quite small they are infinitely better in flavour, and the plants grow more freely, producing quantities of fruits. The Fruit and Vegetable Committee examined the stocks on August 24.

F.C.C.=First-class Certificate.
A.M.=Award of Merit.

1. Bush or Cluster Marrow (Barr).—Compact habit; fruit long, white, smooth, and of medium size. Good crop.

2. Custard (Hurst).—A very good selection of this type, and very prolific. Those who object to the usual type of Vegetable Marrow, as being very watery when cooked, will find the 'Custard' drier.

3. Dark Green Long (Wythes).—Trailing habit; fruit large, smooth, long, dark green striped with yellow. Heavy crop.

4. Defiance, **A.M.** September 1, 1903 (J. Veitch).—Trailing habit; fruit small, roundish oval, smooth, dark green striped with a paler colour. A very prolific variety.

5. Early Long Green Bush (Hurst).—Compact habit; fruit rather large, smooth, long, dark green marked with a much paler green. Good crop.

6. Edwards' Defiance (Edwards).—Similar to, but not so prolific as, No. 4.

7. Green Yellow-striped Oblong (Wythes).—Trailing habit; fruit of medium size, oblong, white, not green and yellow, smooth. Heavy crop.

8. Green Yellow-striped Long (Wythes).—Trailing habit; fruit rather large, smooth, long, dark green with paler stripes. Good crop.

9, 10. Improved Custard (Sutton, Barr).—Same as No. 2.

11. Large White (Barr).—Trailing habit; fruit large, white, slightly ribbed. Good crop.

12. Long Bush (Hurst).—Compact habit; fruit large, white, slightly ribbed. Good crop.

13, 14. Long Bush (Sharpe).—Distinct from No. 12. Compact habit; fruit large, long, smooth, dark green striped with paler green. Good crop.

15. Long Green-striped (Barr).—Trailing habit; fruit large, long, slightly ribbed, green striped with a paler colour. Heavy crop.

16. Long Green (Sutton).—Trailing habit; fruit large, long, smooth, very dark green. Heavy crop.

17. Long Cream (Sutton).—Trailing habit; fruit rather large, long, white, slightly ribbed. Good crop.

18. Long-ribbed Trailing (Hurst).—Similar to No. 17.

19. Long White (Sutton).—Trailing habit; fruit medium size, long, white, smooth. Heavy crop.

20, 21. Moore's Cream (Hurst, Barr).—A very pretty well-known oval, smooth, white, variety of trailing habit, and one of the best.

22, 23. Oval Yellow (Wythes).—Trailing habit; fruit large, oval, white, slightly ribbed. Heavy crop.

24, 25. Pen-y-byd (Hurst, Barr).—One of the most prolific varieties, of trailing habit, fruit round, smooth, white. Very heavy crop.

26. Perfection (Sutton).—Trailing habit; fruit small, roundish oval, smooth, very dark green. Heavy crop.

27. Sutton's Marrow, **A.M.** September 1, 1903 (Sutton).—Trailing habit; fruit small, oval, white, smooth, handsome. The heaviest crop in the collection.

28. Wythes' Round (Wythes).—Trailing habit; fruit of medium size, oval, slightly ribbed, dark green striped with a paler colour. Moderate crop.

BOOKS RECEIVED.

"Book of the Daffodil." By Rev. S. E. Bourne, B.A., F.R.H.S. (John Lane, London.) 2*s.* 6*d.*

We have still a vivid recollection of how, when we were at school some half-century ago, if we took up a carelessly done Latin exercise, the master would simply toss it on one side and pay no attention to it, whereas on those rare occasions when a little extra diligence had produced a somewhat superior article he would score it through here and there with his red-ink pen and alter it considerably; in fact, the better done it was the more mottled with red ink would it be when it left the master's desk. He did not think a bad exercise worthy of his serious attention, but the better done it was, and the more it showed evidence of diligence and care, the greater the pains he took to point out a still more excellent way. It is exactly in that spirit that we criticise "The Book of the Daffodil." It is excellently well done, and if twenty were full marks we should give it at least nineteen. No Daffodil-grower should be without it; it will in every chapter amply repay his study. Having said so much—and it deserves no less—we remark that, being written "by a cultivator for cultivators, and not by a botanist or for botanists," the divisions and subdivisions of Chapter III. are unnecessarily laboured, and the scheme of three columns (see note on p. 12) is exceedingly difficult to follow in the printed type. The footnote on p. 26 should have been on p. 25.

We are heartily glad that Mr. Bourne has rescued *Johnstoni* from among the Pseudos and recognised its undoubted *Triandrus* parentage. We could have wished he had also seen his way to give *Cyclamineus* specific rank, or have recognised it as another "typical hybrid," and not continued to class it as a form of *Pseudo*. We are strongly inclined to regard it as a true species, not only from the form of both flower and bulb, but also from the wonderful prepotency with which it impresses itself on all its hybrids. If, however, botanists cannot yet admit it as a species, why should it not be looked on as a natural hybrid by *Triandrus*, out of a small dark *Ajax* like 'Santa Maria,' for example? It is far more like what such a plant would be than like a *Pseudo*.

A note of warning—by no means unnecessary, as we know by constant experience—might have been given, on p. 21 and again on p. 23, not to confuse *Incomparabilis Leedsi* with *Leedsii*.

Might not a single line have been devoted to the wonderful scent of *Jonquilla* and its near relations?

In Chapter VI. five excellent principles are laid down which apply equally to all gardening, and which we cannot too highly commend, though with some of us (those, for instance, who live upon dry and hungry soil) the surroundings can, under no circumstances, be considered "congenial to the nature" of the great mass of plants, and in such places gardening resolves itself into a ceaseless fight against the natural surroundings.

The chapter on "Planting and Nourishing" is excellent.

Mr. Bourne is doubtless right in saying, on p. 43, that cutting the leaves impoverishes the bulbs; it stands to reason that it must do so. We used to think it did grave injury, but we have had reason to modify our opinion somewhat. It chanced that we had a grand lot of some thousands of blossoms in a somewhat exposed position which were wanted specially at Easter. Fearing to lose them, we gathered them every one on the Wednesday evening before Easter, and, as it proved, not one whit too soon, for that very night it had been planned to steal them, and the thieves, coming and finding all the blossoms gone, showed their spite by regularly reaping all the foliage close off at the ground level; some of it they appear to have taken away, but the greater part was left lying on the beds. We expected the bulbs to be much injured, but as a matter of fact in the succeeding year there was no apparent difference between these beds and others which had been untouched. Whilst, then, we are convinced that some injury must be done by cutting too much of the foliage, we think the harm is greatly overrated.

We notice that from one end of the book to the other Mr. Bourne uses the words "sorts," "kinds," and "varieties" as if they were all three synonymous. A master in Israel should have avoided this, as it creates confusion, and in the case of schedules courts disaster. There is no need whatever for the word "sorts," and if the other two are kept strictly each to its own denomination the meaning is always clear.

If there is any mention made of that most tiresome disease which manifests itself in yellow and green striped foliage and white streaks on the yellow flowers, we have overlooked it. It certainly deserves the very serious attention of all cultivators, as at present no probable cause or cure of it has been suggested.

When a second edition is required Mr. Bourne will take as much or as little notice of such criticisms as he thinks fit; but no other book upon the subject will be needed for many a long year, as this is so thorough, so excellent, and so complete.

"The Soil." By A. D. Hall. (Murray, London.) 3*s.* 6*d.*

This work is chiefly a compilation of the most important scientific facts, known up to date, relating to the cultivation of the soil. There are very many other useful books and papers dealing with this subject, but this is a careful and, we think, a masterly collection of the more important facts in them all. For students preparing for examination in the higher branches of agricultural or horticultural science it is almost, if not quite, indispensable. The farmer, gardener, and market-grower will find very much to interest and probably to profit him. He will see clearly the reason for the many operations which have long been practised by the best cultivators. To specialise, we think the excellent chapter on "tillage" is likely to rightly stimulate the cultivator to renewed energy. As a scientific work we cannot give it too great a meed of praise, but the author errs, and in our opinion seriously, in some of the very few suggestions he makes. Practical cultivators who have succeeded in making ordinary farming &c. pay well know the value of experiment, although the results are not recorded. We are perfectly certain that if the author

undertook the management of an ordinary farm or market garden, cultivated to give the best *net* returns, and he looked thoroughly into every detail, he would soon greatly modify his views. Notwithstanding this weakness, we hail the work with great pleasure and recommend its careful study. The published price of 3*s.* 6*d.* is very moderate, especially when compared with others.

"The Rose Garden." By William Paul, V.M.H. Tenth edition. (Simpkin, Marshall, London.) 4to. 26*s.*

All Rose-growers and Rose-lovers revere the name of "Paul," and know that whatever Mr. William Paul, the veteran, undertakes is certain to be thoroughly well done. Fifty-five years have passed away since he first published this book, but each edition has been carefully revised and brought up to the requirements of the date at which it has been issued, so that this tenth edition leaves nothing to be desired. It is really astonishing to find the freshness and vigour which one of Mr. Paul's years has been able to impart to the rewritten chapters; one might well imagine them to be the work of a man in the first stages of enthusiasm for his subject. The book is illustrated with twenty full-page coloured figures, excellently well done; and all the information, both cultural and descriptive, has been brought up to the most recent date, so that it forms an admirable gift-book for anyone, whether just beginning the growth of Roses or already accustomed to it.

"Botany, A Class Book of." By G. P. Mudge and A. J. Maslen. With over 200 illustrations. (Edward Arnold, London.) 7*s.* 6*d.*

This work is primarily intended to meet the requirements of students who are preparing for the Intermediate Scientific B.Sc. and Prel. Sci. M.B. of the London University, or for the Advanced Stage Examinations of the Board of Education. It consists of three parts: (I.) The structure of plant-types; (II.) Special morphology and classification of angiosperms; (III.) Physiology of plants. The types are taken from herbaceous, arboreal, and aquatic plants, and occupy the first seven chapters. Chapter 8 deals with the development and minute structure of the angiospermous flower. This is followed by types of gymnosperms and cryptogams. Part II.: chapters 17 and 18 deal with the flower and pollination; chapter 19, the dispersal of fruits and seeds; chapters 20–22, classification. Part III.: chapter 23 deals with physiology and respiration, and chapter 24 with movements. Part IV. supplies technical terms &c. for methods of describing plants.

"Alpine Flowers for Gardens." By W. Robinson. (Murray, London.) 10*s.* 6*d.* 8vo. Third edition.

This book, first published thirty-three years ago, served to bring both its author and his subject seriously before the gardening fraternity, and from that day to this both of them have advanced in popularity—the author, we might almost say, in love and reverence—with all hardy-plant gardeners; and as long as the present happy turn of the tide in gardening matters, from formal summer bedding designs to the more natural and

far more beautiful and constantly interesting herbaceous borders and rock-gardens, continues, Mr. Robinson's name will be a household word and his books a household necessity. So well known are all his works that it almost seems an impertinence to render them the full meed of praise which they deserve. Suffice it to say that everyone who loves and cultivates hardy garden flowers should possess and will revel in this volume.

"Orchids: their Culture and Management." By W. Watson. Revised and enlarged by H. J. Chapman. (L. Upcott Gill, London.) 25*s.*

The work in its original form, by Mr. W. Watson of Kew, assisted by Mr. W. J. Bean, is well known, and has been well received by orchidists generally. In its new edition, which that excellent authority, Mr. H. J. Chapman, has so carefully elaborated, its value has been greatly enhanced, for the previously restricted cultural details and directions respecting the raising and culture of hybrid Orchids in the old work, have been thoroughly revised and extended, until in the work in its present form they have been made the leading feature. The book, which forms a handsome volume extending over 560 pages, is embellished by twenty coloured plates and numerous illustrations, some of them from old engravings, and the greater and by far the better part from photographs taken by Mr. Chapman himself.

The plan of the work is on the well-known lines, with chapters dealing with the more important points in Orchid culture, followed by an enumeration and description of the genera and species, together with further cultural details under each species; and in one part or other of the work may be found instructions of the clearest kind on apparently every point which the Orchid-grower could seek information about.

The instructions relating to hybrid Orchids, their culture &c., together with a list of hybrids and their parentage, are the best yet published in any work. In the enumeration of the species, too, the author's name is given to each, and many additions and alterations are made, in the course of which a few errors have crept in. For examples, *Coryanthes Bungerothii* is made a synonym of *Catasetum Bungerothii*, and *Cypripedium Victoria-Mariæ* a variety of *C. venustum*, both renderings so manifestly incorrect as to cause wonder as to how they got so placed. *Stanhopea oculata*, too, in the illustrations is named *S. tigrina*, and a few other errors appear. Nevertheless, the work is the best, most complete, and handiest for reference which has yet appeared, and an important help to Orchid culture in all its branches.

"The Tree Book." By Mary Rowles Jarvis. (John Lane, London.) 3*s.*

Though of little value as a reference work, yet the writer's insight into tree life generally should make the book both pleasant and profitable reading. A chapter is devoted to each of our commonly cultivated trees—the Hornbeam, for some reason, is omitted—and includes, with a brief description of the general appearance and peculiarities, a rather lengthy account of the myths and lore with which many species have become associated. The writer is evidently not very clear about the particular wood used in the making of lead pencils, and wrongly ascribes it to the

Cedar of Lebanon, whereas the North American *Juniperus virginiana* is the tree from which the wood used in the manufacture of "Cedar-wood" pencils is obtained. There are some rather glaring botanical misspellings, such as at page 108, where the Elder is included as *Tambuscus* instead of *Sambucus*; and forty feet must not be considered as the highest specimen of the Hawthorn, there being a noble tree in the Royal Park at Greenwich which towers to a height of about sixty feet. The illustrations are generally good, though that of the Larch is by no means typical, and the Thorn is hardly sufficiently dense. The novel chapter on "How to distinguish Trees" will be useful to the amateur, and the descriptions are from the pen of evidently a keen observer. Altogether the book is a useful one of its kind, and is written with the air of one who knows her subject-matter well.

"Sweet Violets and Pansies." Edited by E. T. Cook. (George Newnes, London.) 3*s.* 6*d.*

Another excellent number of "The Country Life Library," and though it is smaller than any of its predecessors it will be none the less welcomed by those whose fancy runs on Violets and Pansies—especially Pansies, for of the ninety-eight pages of which the book consists fifty-seven are devoted to Pansies and so-called Violas, twenty-six to a description of the many species of the genus *Viola*, and fifteen to Garden Violets; but in these fifteen pages there is a veritable mine of information on soil and manures for Violets, on making the beds and raising and managing the plants, and the best varieties are mentioned, both single and double, and for both outdoors and in frames. The Pansies and Violas are treated of at greater length, but not, in our opinion, with any greater utility. By far the most interesting portion of the volume is the chapter on the various species called "Violets of Mountain and Plain." Between forty and fifty species are described, many of them coming from America. We are deeply indebted to Mr. Cook for this chapter.

"The Book of Herbs." By Lady Rosalind Northcote. (John Lane, London.) 2*s.* 6*d.*

A book which must have entailed a maximum of research with probably a minimum of utility. That it must be full of interest to anyone interested in the subject is undoubted, but who really wants to know that "Dittander or Pepperwort grows wild in a few places in England, but was once cultivated"? It was sometimes used as "a sauce or sallet to meate, but is too hot, bitter, and strong for everyone's taste." These qualities have gained it the names of Poor Man's Pepper and, from Tusser, Garden Ginger. It is so "hot and fiery sharpe" that it is said to raise a blister on the hand of anyone who holds it for a while, and *therefore* it was recommended "to take away the marks of burning with fire or iron." And that is all we are told about Dittander or Pepperwort. We do not for a moment suggest that there is any more to tell, for the book all through shows signs of most diligent and widespread research; we only quote it as a sample, and a perfectly fair one, of what is told us of multitudes of old-fashioned "herbs" which have long since gone out of cultivation owing to their inutility, and we cannot fancy anyone but an

antiquary having any interest in their resuscitation. We have nothing but praise for Lady Rosalind's most careful and diligent research; we only wonder whether it might not have been bestowed on a more useful subject. Still, antiquarian gardeners (if there be such folk) will revel in her notes, and it will always form an excellent book of reference on the subject.

"The Book of the Honey Bee." By C. Harrison. (John Lane, London.) 2*s.* 6*d.*

There are few branches of rural industry that possess so extensive a literature as bee-keeping. From Columella and Virgil to Cowan and Maeterlinck innumerable writers have dealt with the different aspects of bee-keeping; but so numerous have been the improvements in apiculture in recent years, and so great the increase in the number of bee-keepers, that there is ample room for further literature. Mr. Harrison's work is of a practical nature, being intended specially for the guidance of beginners in the craft, and the style in which it is written is so clear and concise that anyone who reads it carefully cannot fail to understand the main principles underlying modern bee-keeping. It is not overstating the case to say that bee-keeping yields a larger return for the capital invested than any other rural industry; but modern bee-keeping requires learning, like any other occupation, and those having no previous experience of the subject cannot do better than obtain a trustworthy guide-book such as the one before us. The general arrangement of the book is practical, and some of the illustrations, especially those from photographs, are more likely to convey an accurate impression to the novice than most similar illustrations to be found in bee-books. The photograph on p. 66, showing the unsealed brood, is the best of the kind that we have seen; but there is no reference to it in the text, nor is it included in the list of illustrations. As a matter of historical accuracy, we may remark that Prokopovitsch was the name of the Russian frame-hive pioneer.

Perhaps the section on bee appliances and their uses is the one most open to criticism. While the hive selected, the W.B.C. hive, is no doubt the best now in use, and the working drawings for its construction will prove exceedingly useful to amateur hive-makers, yet the frame illustrated cannot be considered as up-to-date. The split top bar is not only a source of weakness, but the groove thus formed is found in practice to harbour moth larvæ and other vermin. The method of wiring the frames as described is not practical, because wire on the outside of the frames encourages propolisation and is an obstacle to the scraping of the frames, besides obstructing the bee-way. Nor is the section rack illustrated the most suitable for the purpose; there should be "followers" on two sides in order to keep the sections close together. The wax extractor shown and described is more suited for a large apiary than for one of average size, and no mention is made of that extremely useful and cleanly appliance for the small bee-keeper, the solar wax extractor. Even during the late cloudy summer solar extractors have worked satisfactorily, with a minimum of trouble to their owners. Another very useful adjunct to the apiary, namely, the celluloid quilt, has also been omitted. To the beginner especially this is invaluable, as it enables him to inspect the

hive at any time and in any weather without disturbing the bees. We notice that Mr. Harrison shares the ancient and still surviving prejudice against beet sugar as bee food. As a matter of fact any refined white sugar is suitable for bee food, whether its original source be cane or beet. The latter is extensively used for the purpose on the Continent and in this country by those whose knowledge of the subject is up-to-date.

With regard to the chief enemy of the bee-keeper, namely, foul brood, the spraying of the clothes with weak carbolic is of very doubtful efficacy, and in unskilled hands such an operation is not devoid of danger. Loose calico sleeves or overalls should be worn while handling diseased stocks: these can be disinfected much more easily than the clothes themselves. In the interest of bee-keepers we wish that Mr. Harrison's statement that almost every county in England has its bee-keeping association were even approximately correct.

"The Alpine Flora." By Dr. Hoffmann. (Longmans, London.) 7*s.* 6*d.*

The word "Alpine" is used in its strict sense, and the book concerns itself solely with plants of the Alps of Southern Europe, ordinarily called the Alps of Switzerland, although many of the highest peaks lie in France, Italy, and the Tyrol. No attempt is made to deal with the whole Alpine flora even of these mountains, but a selection is made of such plants as belong exclusively to the mountains, and of them only such as would be likely to attract the attention of a tourist fond of flowers are mentioned. This limitation has its advantages for the ordinary tourist. He is not burdened with a cumbrous volume, nor need he waste much time in establishing the identity of any flower he may have gathered: if it is a bright and striking one he will quickly find it, and if not it has probably not been thought worthy of mention. The coloured figures, of which there are about 250, are really excellently well done, so that the book will thoroughly well answer its purpose of a popular handbook of introduction to the more striking flowers of the Alps, and intended to lead up to the study of more distinctly botanical works. The Ferns have been very shabbily treated—only six being so much as mentioned—and of those figured we think a better selection might have been made than *Asplenium Trichomanes*, *Scolopendrium vulgare*, and *Blechnum Spicant*, three of our commonest English Ferns, which any ordinary tourist might be presumed to know. The figure of *Scolopendrium vulgare* represents it with a thoroughly creeping rhizome in the way of a *Polypodium*.

"Packing and Selling Fruits and Vegetables." By R. Lewis Castle. (Collingridge, London.) 1*s.*

This is the essay which won the Gold Medal offered by the Worshipful Company of Fruiterers, and is intended for "cottagers and small holders of land," but is better suited, we fancy, for the latter than the former. It is an excellent little book for small market-gardeners using from five to twenty acres of land; indeed, it contains a great deal of advice which even larger growers would do well to follow. For example: "It is needful to keep up to the times in the selection of varieties. . . . Every cultivator

should watch carefully the additions that are made to the lists [of new fruits and vegetables] and endeavour to profit by them. Older and well-tried types which give satisfactory returns are not to be discarded without substantial reason, but sometimes on the score of earliness or lateness alone a new variety may bring in greatly advanced prices." Another much-needed bit of advice is to sow and to plant out in good time, for "a few days' difference in this often makes a wide difference in the time of marketing, and consequently in the price realised." We are delighted to learn on such good authority that, though "size still exercises an undue influence, there is an increasing tendency in the best markets to pass the coarsest produce for clean even samples of moderate size, but showing good cultivation and quality." "The better class of buyers do not look with favour upon the huge specimens" which are still too much cherished by many. The directions for making bags, boxes, and baskets at home in winter evenings are excellent, and we can but hope that many will employ their time so profitably as Mr. Castle suggests. The whole book is full of most useful suggestions; but, as we have said before, though a cottager may without doubt gain a great deal from its study, it is more generally applicable to a grower with the command of rather more land, time, and money than the average cottager can possibly be presumed to have.

"Botany, A Text-book of." By Dr. E. Strasburger, Dr. Fritz Woll, Dr. H. Schenck, and Dr. A. F. W. Schimper. Translated by H. C. Porter, Ph.D. 2nd. ed. 686 illustrations, in part coloured. (Macmillan & Co.) 18*s*.

Comparing this edition with the first English one, there are ninety-two additional figures, four extra pages of index, and twelve pages of an *Index to Literature*. Part I. treats of external and internal morphology, and also of physiology. Part II. describes typical plants of (1) Cryptogams and (2) Phanerogams. It concludes with a systematic index of officinal and poisonous plants as well as a general index.

"A Concise Handbook of Garden Flowers." By H. M. Batson. (Methuen, London.) 3*s*. 6*d*.

Few books are so true to their names and their pretensions as the present. It is a pattern of conciseness, and that without being in any sense meagre or scrappy. Some 1,300 plants are mentioned, with amply sufficient cultural details to satisfy anyone who knows the merest smattering of gardening. Here is a specimen, taken where the book fell open:—

> "'Lilium elegans' (Elegant Lily), Liliaceæ. Japan. 1 to 1½ ft. Yellow, apricot to red. July and August. Offsets. Syns. *L. formosum*; *L. Thunbergianum*. A dwarf hardy species admirable for forcing, and for masses in borders or in rock-garden. It likes deep planting in a light loam with peat and leaf mould, but will often thrive in ordinary soil even on a clay bottom. There are many forms."

Then there is a really splendid index, which gives all the English as well as the Latin names.

"Woburn Experimental Fruit Farm." Third Report, by His Grace the Duke of Bedford, K.G., and Spencer Pickering, F.R.S. (Eyre and Spottiswoode.) 1*s.* 6*d.*

A pamphlet of fifty-six pages only, but abounding with most interesting and useful conclusions, arrived at after due and careful experiment, on the effect of grass on fruit trees. The present report deals chiefly with the result of experiments devised to ascertain the *cause* of the deleterious action of grass on trees; and though the actual cause still remains unsolved, yet considerable progress has been made in the right direction by eliminating most of those causes which have hitherto been suggested. The deleterious effect which grass is found to have on trees is shown to be due neither to an interference with the food supply, nor the water supply, nor the air supply of the tree-roots, so that it must in all probability be attributed to the action of some product, direct or indirect, of grass growth, which exercises an actively poisonous effect on the roots of trees. The pamphlet should be studied by all interested in such subjects.

COMMONPLACE NOTES.

By the Secretary and Superintendent.

New Hall and New Garden.

We place this among Commonplace Notes for the Irishman's reason that there is nothing at all commonplace about it, but very much the opposite.

When, in 1887, the Society took the first step of its new departure, or rather of a return to its old lines of a strictly horticultural policy, abandoning all side issues which have such a tendency to obscure and eventually to swallow up the main one, who ever thought that in 1903 it would be within actual sight of a New Hall and Offices, and a New Garden, of its own? In that critical year of 1887 there were only 773 subscribing Fellows, yielding an income of £1,938; the expenditure was £2,894 and the floating debt £1,152. The new policy, or the return to the old one, of sticking to gardening pure and simple has, up to December 1902, increased the number of subscribing Fellows to 6,228, yielding a subscription income of £6,982; the debt has been paid off; and investments accumulated yielding a further income of £437 a year!

Over and above all this, which one may call the natural outcome of a gardening policy, there has arisen among the Fellows a double demand and want, one for a New and satisfactory Hall and Offices of our own, the other for a New and satisfactory Garden of our own. At one time it seemed as if these two great and acknowledged wants would rend the Society asunder and destroy each other, like the birth of twins struggling for primogeniture. Each side acknowledged the legitimate aims and objects of the other; each at heart felt kindly disposed toward the other, but neither was willing to yield precedence, fearing that if it did so its own genesis would be postponed until the Greek calends, for each appeared to involve so large an outlay as to bid fair to cripple the power of the Society, as regards the other, almost indefinitely.

In this condition of things two noble benefactors have come forward to the rescue. Baron Sir Henry Schröder, Bart., has taken up the cause of the new hall with his accustomed energy, starting the building fund with a donation of £5,000, and Sir Thomas Hanbury, K.C.V.O., has purchased the famous garden of the late Mr. G. F. Wilson at Wisley at a cost of £5,000 and given it in trust for the use of the Society as long as it can utilise it and cares to retain it. And thus it comes to pass that the completion of the Society's one hundredth year in March 1904 will practically see it in possession of a magnificent Hall and Offices of its own and of a freehold Garden, *of its kind* equal, if not superior, to any in Europe.

The Fellows of the Society cannot be too grateful to Baron Schröder and to Sir Thomas Hanbury for their munificent and timely liberality, but it is universally acknowledged that great privileges entail corresponding

responsibilities and duties. These great gifts entail the responsibility of their completion. Fifteen thousand pounds is still wanted to complete the New Hall and Offices, and £5,000 is needed to equip the Garden. Surely, surely the Fellows will find these necessary amounts? Let all who wished for a New Hall send a subscription to it now, and let all who wanted a New Garden send a subscription to it likewise. The bone of contention as to which project should have precedence of the other has been taken away by these two kind and generous friends of the Society; now the duty falls upon the rank and file of the Fellows to join together to complete the one and to equip the other. We have 7,000 Fellows, and if every one would send *an average* of £3 a head both Hall and Garden would be complete. Many who, when the Hall Fund was started, excused themselves, saying, "No, I should prefer a Garden," have now obtained their wish. Let them now come forward and show that it was not a mere excuse, by giving liberally towards the Garden. For it must be borne in mind that though the Garden at Wisley is one of the most beautiful spots you can imagine, and is full of beautiful and rare plants, it is at present only a superb "wild garden," and for the purposes of the Society needs a Scientific Department, a Vegetable Quarter, a Fruit Garden, and Glass-houses added, besides dwelling-houses for the staff—the nearest village being two miles distant, and even there no house accommodation to be had. The Hall, too, is now half finished, but the funds to pay for it are not yet raised. Financial help is now the one thing needed to make the year of the Society's centenary dawn with roseate hue. Surely we shall not appeal to the Fellows in vain?

It may be said, "Why not use the Society's invested funds?" Because the annual upkeep expenses of both Hall and Garden will be very large, and if you spend investments you decrease annual income, and if you *decrease* annual income, how are these *increased* annual expenses to be met? No, let us all put our shoulders to the wheel, and each and all, small and great, *do something—as much as ever we each can*—and so endeavour to start the Society upon the second century of its existence in prosperity as well as peace. Peace has, we trust, been thoroughly restored by the kind actions of the Baron and Sir Thomas; now let the Fellows themselves combine to secure the much-to-be-desired prosperity. May we seriously entreat everybody to send *something*, some more than the average £3 a head, some less; but each as best he can, and everybody *something*?

It is hoped that both Garden and Hall will be able to be opened to the Fellows in the early part of next year, but at present it is impossible to admit anyone to either.

How to Help the New Hall and Garden.

Great was the pleasure which we felt on opening the following letter, which reached us on September 22:—

"We beg to inform you that we sold at our Sale Rooms on Friday last a plant of *Zygopetalum Roeblingianum* for a sum of fifty guineas. This was the property of C. G. Roebling, Esq., of Trenton, New Jersey, U.S.A., and his instructions are that the sum realised is to be handed

over to you to be added to the fund which is being raised for the building of the Society's New Hall.

"We are very pleased to have been able to offer our services in the matter, and of course we have no intention of deducting any charges.

"We have much pleasure in enclosing our cheque for 52*l.* 10*s.*

"We are, dear Sirs, yours faithfully,

"PROTHEROE & MORRIS."

Is not this an example which many in this country might well follow? Coming as it does with absolute spontaneousness from an American gentleman as a token of goodwill towards our old Society, it makes the gift as graceful and charming as it is welcome and unexpected.

SCIENTIFIC WORK AT WISLEY.

That definite scientific work should be done at Wisley for horticulture will probably be agreed to by all. The only difference of opinion will be as to what special direction that work should take, what detail or branch of horticulture it should chiefly concern itself with, and last, but by no means least, where the funds to provide for it are to come from. One correspondent says:—

"My hope is that this may be the long-desired chance of starting a properly equipped station for the study of breeders' problems by scientific methods. None of the American or Continental stations do what is wanted. They are all *bound* to try for immediate results of utility, and the permanent importance of their work suffers greatly thereby, as most of them admit.

"The kind of ground-knowledge which both the naturalists and the practical breeders of plants or animals need, can only be got by sticking to a few simple cases and following them out minutely for a period of years. Three or four species would be quite enough to begin with. As soon as the hereditary rules had been thoroughly mastered in a few cases there would be material for the construction of a real science of breeding. The extension to other cases is comparatively simple.

"There is not the smallest doubt that this can be done. The methods of work are clear. The consequences to biological science, and I believe to all industrial arts concerned with breeding, would be incalculably great.

"This is the one really large field of research ready to hand which is unexplored. No one has yet gone into it with both the proper training and adequate resources.

"You will doubtless have many suggestions as to the utilisation of this great opportunity, but it seems to me that to lay the foundation of a comprehensive and precise knowledge of heredity and variation would be a work worthy of the Society and in the end gain the approval of naturalists and breeders of all nations.

"Of course, everything turns on the question of funds, after the upkeep of the Garden has been provided for. I assume that to be a first charge.

"As the ground is free, the chief expense would be labour, and the payment of the experimenter, who, for the purposes contemplated, must

be a scientific man. His position would correspond to that of a chief observer at an observatory. He must certainly live on the spot, and I imagine, if he devoted himself to the work, it would not be possible for him to earn anything considerable in addition to his stipend. It would not do for him to attend merely when the plants are in flower. It is practically necessary to be almost always present, even with small experiments, and this would be still more essential in the case of the larger operations which an institution should undertake.

"There must be some greenhouse accommodation on a moderate scale, and it would be desirable that at least one of the species investigated should be a winter-flowering form (such as *Primula sinensis*), so that the work could go on all the year round.

"I do not know if such a programme as this will strike you as feasible. If it does, let us consider the details. The expense seems the chief difficulty, but I am not at all sure that it would be impossible to collect the funds if the objects were understood."

Our correspondent opens up a most alluring prospect. Possibly someone with a love of science may be encouraged to come forward and provide the necessary funds to start the matter and keep it going for the first few years.

Exhibition at Düsseldorf.

A large international horticultural and agricultural exhibition is being organised at Düsseldorf, the beautiful garden city on the Rhine. The exhibition will be opened in May next, and is under the patronage of the Crown Prince of Germany, who will perform the opening ceremony. The Ministers of Trade, Public Instruction, Agriculture, and Finance will hold the post of Presidents. The exhibition will be one of the most complete of its kind ever held, and every effort is being made to render it thoroughly representative. A notable feature will be the arrangement of the various groups of plants, fruit, and vegetables, showing, in connection, their respective methods of cultivation and treatment, and the progress of scientific knowledge. The social and educational aspects of horticulture will not be overlooked, and there will be a section devoted to specimen gardens for workmen and children. A very important trade and industrial section will also be included, which will comprise exhibits of all the implements, tools, and utensils necessary for the carrying on of horticulture and agriculture.

It may be remembered that an important trade and art exhibition was held at Düsseldorf last year, which was a great success. The city is admirably adapted for the purposes of an exhibition. The beautiful grounds, situated on the banks of the Rhine, rising in terraces, are peculiarly well adapted for the purpose of a horticultural and agricultural exhibition.

Anyone interested in the exhibition may obtain full particulars of Herr Hess, 10, Wilhelmsplatz, Düsseldorf, Germany.

Too Many Varieties of Apples.

With such a vast number of varieties of Apples—and they are being added to annually—it is most difficult for the amateur to decide which

to plant and which to avoid; and while acknowledging that varieties which succeed admirably in one place are sometimes failures in others, there are certain varieties that are either not worth growing, or are so long in commencing to crop freely that, in these days when quick returns are desired, only disappointment would follow from planting them. In mentioning the following, we only give our individual experience in different parts of the country, trusting that it may induce intending planters to be careful how they select their varieties before ordering their trees. Take, for instance, that immense Apple 'Belle Dubois' (*syn.* 'Gloria Mundi'): seeing it on the exhibition table, many are tempted to order trees; but we never saw a heavy crop on the trees yet, and on heavy or light soils our experience is that no variety is more prone to canker. Another very showy and striking Apple is 'Bietigheimer Red,' and for exhibition it is no doubt a telling dish in a collection, but we have always found it one of the lightest bearers. The well-known 'Cellini Pippin' is a most excellent bearer and of good quality on warm and deep well-drained soils; but on thin or cold soils it cankers badly, and the fruits are prone to become spotted, and rot on the trees before they are ripe. Another excellent variety, viz. 'Blenheim Orange,' requires a good deep warm soil, and plenty of patience, to get heavy crops; probably no Apple is longer in coming into bearing or gives better results when bearing does begin, but for the amateur it is often most disappointing. Sometimes we hear it said that 'Cornish Gilliflower' is superior in flavour to 'Cox's Orange Pippin,' but though it may rival it, it so seldom bears even a moderate crop that it can scarcely be said to pay for its room. 'New Hawthornden' is a very fine-looking Apple, and the tree is a good grower and very free bearer, but our experience of it is that it is one of the worst cooking varieties grown, neither baking nor boiling well; in fact, in some seasons, it is so tough that it cannot be cooked at all. 'Round Winter Nonsuch' is occasionally recommended as a useful long-keeping Apple to plant; but, having grown it as bush, pyramid, and standard, it has always proved a remarkably shy bearer. 'Mère de Ménage' and 'Striped Beefing' are only suitable for planting as standard trees, and then they are a long time in getting into a free-cropping condition. When planted as dwarf trees, they have to be continually root-pruned to procure a crop. Many other varieties could be named more or less unsatisfactory, and it would be a great boon to nurserymen, market growers, and amateur and professional gardeners if the catalogues of Apples could be reduced to moderate dimensions; not only should we have heavier crops of finer quality, but barren or comparatively useless trees in our gardens and orchards would not be so conspicious.

Fellows in the British Colonies and in the United States.

Of whatever political creed we may be, all the peoples of Great Britain (and of Ireland too) must surely rejoice in the wonderful consolidation of the Empire which has recently advanced with such leaps and bounds. The more general acknowledgment of the ties of kinship and the drawing closer of the bonds of friendship, between the old

motherlands and the newer lands across the seas are matters for unmixed rejoicing, and anything which helps, in however small a degree, to promote and keep alive these feelings of kinship and friendship should be gladly taken advantage of by all. We hope, then, that in the next few years we may receive a large access of Fellows to our Society living in the Colonies—lovers of gardens and of the outward face of Nature—who will feel it a privilege as well as a duty to help support and to keep in touch with the many useful and long-established institutions of the old Mother Country. Fellows living in the Colonies and joining our Society will find that the advantage is not by any means all on one side, for besides the satisfaction of helping on the work of our Society they will receive our JOURNAL regularly, despatched to them by post as soon as it is issued from the press, and many and many a colonist has borne witness to the immense assistance he has gained from the JOURNAL of the Society. For the information of colonists in distant lands we may mention that the volume for 1901–2 consists of 1,240 pages with 357 illustrations of new or rare plants, plant diseases, &c.; and the volume for 1902–3 has 1,478 pages of letterpress with 287 illustrations, besides seven coloured plates. The Society has now entered on the hundredth year since its first foundation in 1804, and it would cordially welcome, and rejoice to enroll among its Fellows, any colonials who would like even in this small way to help on the feeling of unity and friendship between the centre and the most distant parts of the Empire.

And what has been said of British colonies applies with almost equal force to the United States of America, that great nation across the sea which is almost entirely British and Irish by descent and parentage. The centenary of our Society should see a large number of American citizens wishful to join our old Society, which played so great a part in the botanical exploration of North America in the first half of the last century.

Besides sending to all our JOURNAL, we also hunt out for Fellows as far as we can any questions in which they may be interested in plant life, and obtain for them, as far as we can, by purchase or exchange, new or rare seeds which they may be unable to procure in their own country.

Anyone interested in gardens and gardening, in plant diseases and plant life, is welcomed as a Fellow of this old Society, and should write to the Secretary, 117 Victoria Street, Westminster.

VERY EARLY TOMATOS.

A Fellow living in Canada writes that he is anxious to get good crops of Tomatos very early in the year, and he has been informed that it is necessary to collect the pollen during the summer and dry it and store it till winter, and then use it for artificially impregnating the earliest blossoms. We cannot say whether this is really necessary in Canada, or whether the dried pollen of the Tomato would prove fertile or not, but in England we do not experience much difficulty in getting the blossoms to set even in mid-winter. The soil must be kept rather dry and the blossoms should be hand-fertilised in the middle of the day, from half-past eleven to twelve o'clock, when the sun has most power. We do not suffer

particularly from any lack of pollen on very early plants, but unless the air of the house is dry and buoyant it is difficult to free it properly from the anthers, and hence the great importance of "setting" the blossoms at mid-day. On a bright sunny day, simply giving the plants a good shake will sufficiently distribute the pollen; but if it be dull and gloomy and damp, transference by camel's-hair brush may become necessary. It should be borne in mind that Tomatos will not set freely if the growth is very gross or if the plants are over-watered.

Sub-tropical Gardening.

Nothing has pleased us more in recent years than the rapid and parallel growth of Hardy Gardening and of a more Natural Gardening. Twenty to thirty years ago gardens were far too Formal and the plants far too Tender, and the tendency seemed to be to become more and more formal and tender, the tiniest little plants being used, and their poor little heads being clipped week by week with the scissors or the shears! But, like everything carried to excess, a time of revulsion has set in, and now everything must be Hardy, and everything in a more Natural style. Good! It pleases us well. And yet it would be a pity to run to the opposite extreme and overlook the fact that there are positions and places where Formal Gardening may well be retained, and positions and places where Tender and even semi-tropical plants may with advantage be used in this country. The Rock at Torquay (figs. 40 and 41) affords an admirable instance of the latter. There you may find Bananas, *Strelitzia*, Agaves, Yuccas, Palms, &c., with beds of brilliant Begonias and delightful little pools of clear water with goldfish, the whole effect being most beautiful and most restful, and providing a change which even the most prejudiced would surely welcome *in situ*, though he might have no desire to transplant it to his own home garden. The photographs were kindly sent us by the Rev. W. J. Packe, M.A., Vicar of Feering.

Plants and Shrubs for growing under Trees.

We are frequently questioned on the best things to plant under the shade of trees, and the answer must always depend on the place on which the tree or trees are growing. If an isolated tree on a lawn, nothing is much better than Ivy, which will keep green and healthy for many years, if cut back a little every spring, and a mulch applied immediately afterwards of well-rotted manure; for unless this is done the Ivy often becomes weak and miserable-looking, until it eventually dies. Should Ivy not meet with favour, *Poa annua* and *Poa nemoralis* will thrive under deciduous trees: the former is a very dwarf-growing grass, and the latter rather tall. Periwinkles, St. John's Wort, and *Berberis Aquifolium* are all excellent for growing under single trees, or under a mass of trees. Where there are a quantity of trees growing together, and undergrowth is wanted, there are a few things better than the Sloe, or Blackthorn, as may be seen in most of the game coverts about the country. Other shrubs that are all more or less satisfactory are *Rhododendron ponticum*, Privet, Box, Hollies, Common and Portugal Laurels, *Berberis buxifolia*

FIG. 40.—SEMI-TROPICAL GARDENING AT TORQUAY.

FIG. 41.—SEMI-TROPICAL GARDENING AT TORQUAY.

and *B. Darwinii*, Aucubas, American and English Blackberries, and many other plants, such as Elders &c.; but when this undergrowth is near the house or drive the sense of tidiness causes all the fallen leaves to be raked up, and very often the ground dug every year, to the serious detriment of the underwood plants, which thus have all their best roots annually mutilated and destroyed. If the leaves must be raked up to keep the place neat, then a mulch of manure, soil, or burnt garden refuse should be given annually to compensate for the loss of plant food by the removal of leaves; and instead of digging it in, allow the mulch to lie on the surface, where the roots will soon find it, and benefit exceedingly.

Mushrooms in the Open Fields.

Several Fellows have recently inquired how it is that no Mushrooms grow in their fields, although apparently the land is suitable. Provided the land is good and not subject to floods, there is no difficulty in having plenty of Mushrooms in the open fields almost every year, though, of course, some seasons are so wet and cold that few, if any, Mushrooms are produced; but, given an average season, the small expense incurred is paid over and over again. Early in May procure some good fresh spawn and break it up into pieces about the size of a hen's egg, inserting each piece about three inches deep in pasture land and covering it over firmly with soil. A very good plan that we practised most successfully was to take a sharp spade and, after inserting to the proper depth, raise the turf by leverage on the spade and drop the Mushroom spawn underneath, then withdraw the spade and tread down firmly. By this means the turf is not injured, and should dry weather follow it continues green, which would not be the case if the turf were lifted bodily and replaced. The distance apart between the pieces of spawn may vary from six feet to six yards. In a field of five acres that we once spawned at the latter distance we gathered Mushrooms in enormous quantities for over a month, this particular field having never produced more than one or two solitary specimens before. The following year we did not respawn the field, but dressed it with 4 cwt. of agricultural salt per acre, with the result that we had nearly as good a crop as in the previous year. It is important that horses, cattle, or sheep should be excluded immediately the Mushrooms appear, otherwise they will spoil half the crop by treading it down &c.

Mealy Bug.

A Fellow writes in anguish: "Mealy Bug has got into our vineries. Are there any publications on this subject, and is there any cure other than cutting down the Vines? And if one house is cut down and replanted, will the bug from the next house get into the new canes, as we cannot replant all the houses at once?"

We do not know of any publication dealing very specially with the eradication of "Mealy Bug." In "Vines and Vine Culture," by the late Mr. A. F. Barron, V.M.H., it is mentioned. But it is by no means easy to get rid of this pest, as it needs constant vigilance during the growing season, killing all the bugs that can be seen *daily* by touching each

insect with a brush dipped in methylated spirit, which is instant death to them. This is done while the Vines are in active growth. In the winter all the loose bark should be removed from the rods, which should then be scrubbed with six ounces of carbolic soft soap dissolved in one gallon of water, repeating this washing just before the Vines are started into growth. All the woodwork of the houses should be painted, the walls well limewashed, and the surface of the border removed and replaced with fresh soil. If this is done thoroughly, few or no bugs will be seen the following year, and if any do appear they can be killed by the methylated spirit.

If the Vines were cut down, the same processes of painting and cleansing which have been advised above would still have to be done, otherwise the new Vines would to a certainty be infested. If one vinery were replanted as suggested, unless great care were exercised, there would be danger of the bug from the adjoining house getting into it.

If the Vines are strong and vigorous, it would be better to eradicate the bug, and so avoid the loss of time and crops; but, as stated, constant watchfulness and thorough cleanliness are absolutely essential to success. Again, no plants of which there is the least suspicion of their harbouring the bug ought to be admitted into the vineries, or all the work will be wasted.

If, on the other hand, the Vines are weak and exhausted, it would pay better to clear out one house at a time, and so gradually renew them all.

NOTES ON RECENT RESEARCH

AND

SHORT ABSTRACTS FROM CURRENT PERIODICAL LITERATURE, BRITISH AND FOREIGN,

AFFECTING

HORTICULTURE

AND

HORTICULTURAL AND BOTANICAL SCIENCE.

Judging by the number of appreciative letters received, the endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural and Botanical periodical literature, has met with success. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to all who have helped in the work all the more hearty.

That anything approaching perfection either in method or execution should have been achieved as yet is not to be expected, but the Editor desires to express his most grateful thanks to all who co-operate in this work for the very large measure of success already attained, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* can alone enable the Editor to continue to cope with the work. The order agreed on was as follows :—

1. To place first the name of the plant, disease, pest, &c., being noticed ; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal &c. in which the original article appears, taking care to use the abbreviation which will be found on pp. 227, 228.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP IN THIS WORK.

Boulger, Professor G. S., F.L.S., F.R.H.S.
Bowles, E. A., M.A., F.L.S., F.E.S., F.R.H.S.
Burbidge, F. W., M.A., V.M.H.
Chapman, H., F.R.H.S.
Chittenden, F. J., F.R.H.S.
Cook, E. T., F.R.H.S.
Cooke, M. C., M.A., LL.D., A.L.S., F.R.H.S., V.M.H.
Cox, H. G., F.R.H.S.
Dean, R., V.M.H., F.R.H.S.
Dod, Rev. C. Wolley, M.A., F.R.H.S., V.M.H.
Druery, C. T., V.M.H., F.L.S., F.R.H.S.
Farmer, Professor J. B., M.A., F.R.H.S.
Goldring, W., F.R.H.S.
Groom, Professor Percy, M.A., D.Sc., F.L.S., F.R.H.S.
Hartog, Professor Marcus, D.Sc., M.A., F.L.S., F.R.H.S.
Hawes, E. F., F.R.H.S.
Hay-Currie, C., F.R.H.S.
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, M.R.A.C., F.R.H.S.
Houston, D., F.L.S., F.R.H.S.
Hurst, C. C., F.L.S., F.R.H.S.
Kent, A. H., A.L.S., F.R.H.S.
Lynch, R. Irwin, A.L.S., F.R.H.S.
Massee, Geo., F.L.S., F.R.H.S.
Mawley, Ed., F.M.S., F.R.H.S.
Moulder, Victor J., F.R.H.S.
Newstead, R., A.L.S., F.E.S., F.R.H.S.
Percival, Professor John, M.A., F.L.S., F.R.H.S.
Rendle, A. B., M.A., D.Sc., F.L.S., F.R.H.S.
Reuthe, G., F.R.H.S.
Saunders, Geo. S., F.L.S., F.E.S., F.R.H.S.
Scott-Elliot, G. F., M.A., B.Sc., F.L.S., F.R.H.S., F.R.G.S.
Shea, Charles E., F.R.H.S.
Shinn, C. H., F.R.H.S.
Smith, William G., B.Sc., Ph.D., F.R.H.S.
Veitch, Harry J., F.L.S., F.Z.S., F.R.H.S.
Ward, Professor Marshall, Sc.D., F.R.S., F.R.H.S.
Webster, A. D., F.R.H.S.
Worsdell, W. C., F.R.H.S.

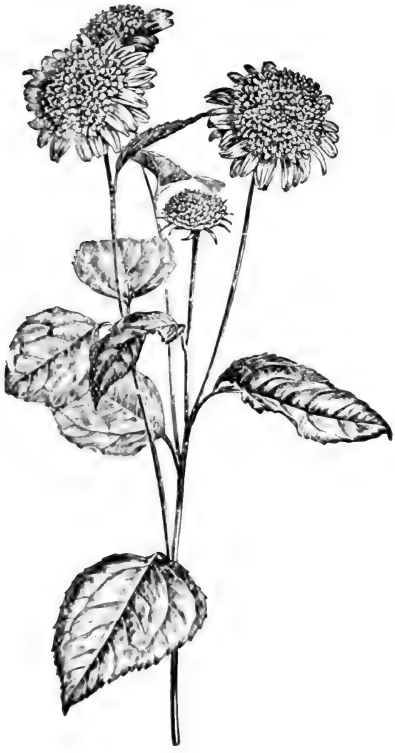
JOURNALS, BULLETINS, AND REPORTS

from which it is proposed to make Abstracts, with the abbreviations used for their titles.

Journals &c.	Abbreviated title.
Acta Horti Petropolitani	Act. Hort. Pet.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
American Gardening	Amer. Gard.
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	Ann. Soc. Nant.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Beihefte 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.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Botanische Zeitung	Bot. Zeit.
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.
Bulletino della R. Società Toscana Orticultura	Bull. R. Soc. Tosc. Ort.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chambers's Journal	Chamb. Jour.
Chronique Orchidéenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Contributions from the Botanical Laboratory, University of Pennsylvania, Philadelphia	Contr. Bot. Lab. Phil.
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.
Flora	Flora.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr. W.I.
Journal of Botany	Jour. Bot.
Journal of Horticulture	Jour. Hort.
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 S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
Kew Bulletin	Kew Bull.
Le Jardin	Le Jard.
Lindenia	Lind.
Nature	Nature.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. König. Bot. Berlin.
Orchid Review	Orch. Rev.

Journals &c.	Abbreviated title.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Queensland Agricultural Journal	Qu. Agr. Journ.
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	Garden.
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.
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.†
Wiener Illustrirte Garten-Zeitung	Wien. Ill. Gart.-Zeit.
Woburn Experiment Farm Report	Woburn.
Zeitschrift für Pflanzenkrankheiten	Zeit. f. Pflanz.

* 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.

Acclimatisation Experiments in Minnesota: Report of the Montevideo Trial Station. By L. R. Moyer (*U.S.A. Hort. Soc. Minnesota Rep.* 1902, p. 51; 4 figs.).—The following trees and shrubs are under trial and are reported useful for growth in the prairie district: *Lycium halimifolium* (but spreads too rapidly); *Lepargyrea argentea*, more commonly known as *Shepherdia argentea*, the Buffalo Berry, fruits well; *Elæagnus argentea*; *Morus alba tatarica*, fairly well established, fruit attracts birds from the Cherries; *Spiræa Van Houttei*, the best of the spring-flowering shrubs; *S. sorbifolia*; *S. salicifolia*, has larger flowers than in wild state; *Neillia opulifolia* syn. *Opulaster opulifolius*, the golden-leaved form being not quite so hardy as the type; many species of *Philadelphus*, *P. coronarius* seems the least hardy; the bush Honeysuckles are all very hardy, *Lonicera tatarica*, *L. tatarica speciosa* (*L. splendens*), *L. tatarica parvifolia* (*L. gracilis*), *L. Ruprechtiana*, *L. Murrowi*, *L. Sullivantii*, are mentioned; *Acer Ginnale*; *Pinus montana* appears to be the hardiest of Pines; *Picea pungens*, the foliage being somewhat browned during severe winters; *P. canadensis*, perfectly hardy, "there are no safer trees of any kind."—*F. J. C.*

Acidanthera candida.—By Sir J. D. Hooker (*Bot. Mag.* tab. 7879).—Nat. ord. *Irideæ*, tribe *Ixieæ*. Native of East Tropical Africa. Two, of about 18 species in the genus, have been figured; viz. tabs. 7393, 618, and 1531. This is a slender glabrous herb, with leaves 1 to $1\frac{1}{2}$ ft. long. Flowers white, very sweet-scented, 2 in. across.—*G. H.*

Acidity of Plants. By A. Astruc (*Ann. Sc. Nat.* (*Bot.*) xvii. pp. 1-108; 1903).—The acids contained in the sap of plants have had various functions ascribed to them: *e.g.* they neutralise bases which might be injurious; they take part in the formation of albuminoids; they are necessary for turgescence of cells and organs, and play an important part in water storage in succulent plants; they assist transpiration, root-action, oxidation in the plant, &c. This paper gives the results of investigations on the occurrence of free or partially combined acids in different plants, and in various parts of the same plant under varying conditions. Part I. deals with non-succulent plants, and the chief conclusions are:—(1) Leaf. Vegetable acids are present in greatest quantity in young leaves, and diminish as the leaves become older, and the younger parts of a leaf contain more acid than maturer parts of the same leaf; the organic acids are gradually fixed by saturation or etherification, and disappear as free acid; the production of organic acids is intimately associated with the processes of respiration and assimilation; the green parts of variegated leaves are richer in acids than pale parts; in etiolated plants the acids increase on exposure to light. (2) Stem. The greatest acidity is in young growing parts. (3) Flowers. Acidity decreases as development goes on,

but begins to increase when the flower begins to fade; this latter is due to the commencement of the growth of ovary into fruit. Part II. deals with the *Crassulaceæ*, a family of succulent plants. Succulents have long been known to be peculiar in their absorption and excretion of oxygen and carbonic acid gas, as well as in their acidity. M. Astruc shows that the acidity (chiefly due to malic acid) increases considerably during darkness; in a leaf partly exposed to full sunlight, the acid-content is distinctly greater in the shaded parts, and less in the exposed parts. This disappearance of acids in succulents is not due to their fixation (which goes on slowly), but is due to the processes of respiration and assimilation coupled with the fact that darkness is more favourable to their formation than light. The greatest variations are in the external leaves of the rosettes. The transpiration of *Crassulaceæ* succulents is influenced more by the salts present in their organs than by their acid-content.—*W. G. S.*

Acrospeira mirabilis, Facts in the Life-history of. By R. H. Biffen, M.A. (*Trans. Brit. Myc. Soc.* 1902; one plate).—This curious mould, found within Spanish Chestnuts, in 1861, by Berkeley has since been credited with being a parasite of the fruit of *Castanea*. Hence the present note acquires some importance. The paper describes a series of cultures of the mould, on various media, and carrying it on from spore form to spore form, until it ultimately results in the production of an ascomycete, leading to the conclusion that the mould described by Berkeley as *Acrospeira mirabilis* is but a stage in the life-history of a *Sphæria*, and it is suggested again, as it has been suggested before, that a careful study of the life-histories of some of the black moulds, or *Dematieæ*, would in all probability show that many more of them are merely stages in the life-history of species belonging to that group.—*M. C. C.*

African Flora (*continued*). By A. Engler (*Engl. Bot. Jahrb.* xxxiii. 1903, pp. 209–384; 13 3 1903).—Comprises mainly a description of new genera and species in the following orders of seed-plants; *Capparidaceæ* and *Ochnaceæ*, by E. Gilg: *Euphorbiaceæ*, by F. Pax; *Verbenaceæ* and *Malvaceæ*, by M. Gürke; *Tiliaceæ*, *Sterculiaceæ*, *Apocynaceæ*, *Asclepiadaceæ*, *Bignoniaceæ*, *Rubiaceæ*, and *Commelinaceæ*, by K. Schumann; and *Myristicaceæ*, by O. Warburg.—*A. B. R.*

Agave Bakeri. By Sir J. D. Hooker (*Bot. Mag.* tab. 7890).—Nat. ord. *Amaryllideæ*, tribe *Agaveæ*. Native of Mexico? This has a trunk about 4 ft. high, with a crown of numerous spreading and recurved leaves, and bears a raceme 9 ft. high. The perianth has recurved lobes, pale green on border and a dark green median line.—*G. H.*

Agricultural Research and Education in America (*U.S.A. Dep. Agr. Ann. Rep.* 1902).—This report contains a summary of the whole of the work undertaken by the Department of Agriculture during 1902. It appears that 5,789 persons are employed by the department, and that the expenditure amounted to $4,503,960 (as compared with $2,467,920 in 1898). The Weather Bureau expended $1,148,320; salaries of other departmental employees amounted to $373,820; the cost of publications for distribution $173,000; and the cost of valuable seeds for distribution $270,000.—*F. J. C.*

Alleys, Pleached. By S. W. Fitzherbert (*Garden*, No. 1635, p. 200; 21/3/03).—In the period when formality ruled in the garden and topiary work was considered the highest form of embellishment for the pleasance, the pleached alley was in vogue, and few were the better-class dwellings of the time that did not number one or more of these shaded walks among their chief attractions. Fashioned generally from native Hornbeam, Beech, or Lime, the pleached alleys furnished pleasant resorts through many months of the year. Sometimes they are formed of evergreens, such as Yew, Box, Holly, or *Cotoneaster microphylla*. The advantage seems to rest, however, entirely with deciduous trees, whose varying conditions from month to month contrast agreeably with the monotonous sameness of the evergreen, the shade of which is also often too dense. Other good trees for use in the construction of alleys are the weeping forms of the Ash and Elm. That this habit of growth is not indispensable is shown by the majority of pleached alleys of old time being formed of trees of upright growth, but those with naturally pendent branches more readily assumed the required shape. Flowering trees may thickly be used, but it must be remembered that if the branches are so trained as to form a shaded walk in the summer, they will probably be too crowded to ripen well, and therefore to blossom as profusely as if they enjoyed more air and light.—*E. T. C.*

Allium Ellisii. By Sir J. D. Hooker (*Bot. Mag.* tab. 7875).—Nat. ord. *Liliaceæ*, tribe *Allieæ*. Native of Khorasan. A handsome plant, with leaves 4–5 in number, 1 ft. in length, $2\frac{1}{2}$ ins. broad. Scape 1 ft. high, bearing a globose compact umbel of bright rose-coloured flowers, 5 ins. in diameter.—*G. H.*

Aloe rubroviolacea. By Sir J. D. Hooker (*Bot. Mag.* tab. 7882).—Nat. ord. *Liliaceæ*, tribe *Aloineæ*. Native of S. Arabia. The stem is 20 ins. high by 4 in diam. Leaves 2 ft. long by 6 ins. broad. Scape, ascending, 2-branched, densely covered with pendulous, pale red flowers, $1\frac{1}{2}$ in. long.—*G. H.*

Amaryllidaceæ, Petal Nerves in (*Beih. Bot. Cent.* xiv. ht. 1, p. 63; 10 figures).—Herr Curt Fraenkel describes the venation of the petals in 117 species belonging to 50 genera of the above order. Ten groups are described, and their systematic relationship (according to Pax) is contrasted with the venation arranged according to these groups. The result does not so far show any clear agreement between venation and natural affinity.—*G. F. S.-E.*

Anatomy of Male and Female Peduncles (*Beih. Bot. Cent.* xiii. ht. 3, p. 341; 20 figures in text).—Herr H. Dibbern gives a sketch of the differences in anatomical structure as seen in the peduncles of twenty-three plants. He shows that the inflorescence departs from the typical anatomical structure of the ordinary stem, and especially as regards the mechanical system or strengthening tissues; that the difference varies according to the differences in weight of the flower-bearing and vegetative stems; and that the male and female axes also differ in those cases in which the arrangement or weights to be supported are different.

G. F. S.-E.

Androsaces, The. By Henry Correvon. (*Garden*, No. 1643, p. 333, 16/5/03; No. 1644, p. 351; 23/5/03; No. 1645, p. 370, 30/5/03; No. 1646, p. 391, 6/6/03).—Of all the plants of the mountains none are more closely tufted or more completely alpine in their appearance and character than the Androsaces; they are the most alpine of alpines, and may be taken as the most completely characteristic type of the flora of the mountain heights. Low of growth, brilliant of aspect, extremely pretty, and covered with bloom, their beautiful flowery tufts enliven tall rock-masses, stony and arid passes, and above all the short thin turf of the higher altitudes. In some parts of the Alps and the Pyrenees they even form an actual turf, short and spreading, completely taking the place of grass. The Swiss mountain-climbers call them 'flowering Mosses,' though, unlike the true Mosses, they are about the brightest and most beautiful objects that the mountains have to show.—*E. T. C.*

Anemone Hepatica angulosa var. **lilacina grandiflora.** By Arthur Goodwin (*Journ. Hort.* April 16, 1903, p. 338).—This very long name introduces a variety said to be a great improvement on the type as regards freedom of flowering. If it comes up to the description, it will be a great acquisition, as the type, though it grows freely, flowers very shyly.—*C. W. D.*

Apple Foliage injured by Frost. By F. C. Stewart and H. J. Eustace (*U.A.S. Exp. Stn. New York, Bull.* 220; 12/1902; 3 plates).—Apple leaves injured by late frosts, causing the lower epidermis to separate from the overlying mesophyll, which continued to grow while the epidermis grew no more, resulting in the formation of wrinkles and blisters.—*F. J. C.*

Apple Foliage injured by Spraying. By F. C. Stewart and H. J. Eustace (*U.S.A. Exp. Stn. New York, Bull.* 220; 12/1902; 2 plates).—Spraying with Bordeaux mixture and insecticides caused the spotting and death of leaves of Apples during 1902, owing to the tenderness of the foliage due to the protracted cold wet weather; but the good done in the prevention of scab more than counterbalanced the harm.

F. J. C.

Apple-growing for profit. By F. W. Moore (*Gard. Chron.* No. 840, p. 68, Jan. 31; and No. 841, p. 91, Feb. 7, 1903).—A paper on this subject was read before the Fruit Conference at Cork on Oct. 17, 1902, and is given *in extenso* in the numbers quoted above. It contains much matter of interest, lays great stress on the desirability of taking more care and trouble in the cultivation of Apples for culinary purposes, and enumerates the best varieties to select for this purpose. In conclusion some very practical advice is given on the subjects of marketing and storing fruit, and the treatment of orchards.—*G. S. S.*

Apple Illustrations. (*U.S.A. St. Bd. Montana, Rep.* 1902).—Illustrations reproduced from photographs are given of thirty-six American varieties of Apples.—*F. J. C.*

Apples in March. By G. Wythes (*Garden*, No. 1633, p. 160; 7/3/03).—Amongst new introductions the writer recommends 'Newton

Wonder' and 'Royal Late Cooking,' which he says will when better known be largely grown.—*E. T. C.*

Apple Rot following Scab. By H. J. Eustace (*U.S.A. Exp. Stn. New York, Bull.* 227 ; 12/ 1902; 9 plates).—The fungus *Cephalothecium roseum* Corda (= *Trichothecium roseum*, Link), until now usually regarded as a saprophyte, became in 1902 a wound parasite on Apples, causing considerable loss by rotting after the harvesting of the crop. The fungus found an entrance into the fruit through the areas attacked by scab (*Fusicladium dendriticum*), which ruptures the epidermis and thus furnishes a means of entrance for the *Cephalothecium*, which could not otherwise attack the fruit, as it is incapable of penetrating the unbroken skin. A characteristic feature of this rot as compared with others (see *Journ. R.H.S.* xxvii. 227) is the shallowness of the attack, the decayed spots seldom extending into the fruit very deeply. Some varieties of Apple were much more severely attacked than others, notably, 'Rhode Island Greening' in the early autumn, while 'Baldwin' and 'Northern Spy' escaped until December, although badly attacked by scab. An account of inoculation experiments is given, and the fungus was found to be able to grow parasitically on Apple, Pear, Quince, and Grape. Thorough spraying for the prevention of scab is recommended. Dipping artificially infected Apples in copper sulphate solution and in formalin was found to prevent the growth of the fungus. The rot caused by the *Cephalothecium* can be held in check by cold storage below 45° Fahr.—*F. J. C.*

Apple Stocks. By Rev. E. Bartrum, D.D. (*Gard. Mag.* n. 2584, p. 309 ; 9/5/03).—An exhaustive account of the suitable stocks for Apples. It is an important subject, and is dealt with in a thorough way by an acknowledged student in pomology. The articles are continued in the two following numbers, and are well worth the attention of all engaged or interested in hardy fruit culture.—*W. G.*

Apple-tree Anthracnose. By A. B. Cordley (*U.S.A. St. Bd. Montana, Rep.* 1902).—This disease has seriously affected orchards in various parts of the States and in British Columbia. The disease is usually known as canker, dead spot, or black spot, but differs from the diseases usually known as canker. It is due to a fungus apparently hitherto undescribed, and for which the name *Glœosporium malicorticis*, Cordley, is proposed. Branches under two or three inches in diameter are usually attacked, and the disease appears first in the autumn as small, irregular, sometimes slightly depressed brown areas on the bark. It spreads slowly during winter, and in the spring, under favourable conditions, may invade an area several inches in diameter. Spores first make their appearance in June, at which time the diseased areas are dark brown in colour, markedly depressed, and in most instances limited by ragged, irregular fissures which separate the dead from the surrounding living tissues. Sometimes a diseased area extends quite round the stem, causing the death of the whole of the distal portion. In the course of a few months the dead bark sloughs off, leaving an unhealed wound. The spores obtained in June failed to germinate, and it was not until October that spores capable of germination were found. The mycelium of the

fungus—the spores germinate in October—gains access to the interior of the stem, ramifying principally near the cambium. It has not yet been determined whether the fungus enters the stem through the cuticle, or whether it makes its way through a slight wound, nor is it known whether the mycelium is perennial in the tissues. Experimental inoculations were carried out with pure cultures of the fungus. Spraying with Bordeaux mixture or with ammoniacal copper carbonate immediately after the autumn rains commence and again after the leaves fall is recommended, the former solution being used only when there is no fruit on the tree.—*F. J. C.*

Aquatic Plants. By M. Lagrange (*Rev. Hort. Belge*, xxviii. No. 6, p. 137).—This article deals with the culture of Nymphæas and *Nelumbium*.—*G. H.*

Asclepiadaceæ, A Morphological Study. By T. C. Frye (*Bot. Gaz.* xxxiv. No. 6, p. 389; 3 plates).—The author refers to a previous paper for details on the development of the pollen (*Bot. Gaz.* xxxii. p. 325, pl. 13, 1901), and discusses the development of the stamen and other parts. He first calls attention to almond-shaped glands between the rays of the umbel and at the base of the sepals. They do not secrete honey, and no evidence of any function was discovered.

The stamens and petals of the plants studied (viz. eight species of *Asclepias* and two of *Acerates*) arise from a common ring. The whole stamen in its older stages shows a remarkable tendency to form intercellular spaces, the tissue resembling the spongy parenchyma of a leaf.

After giving a full account of the development of the stamen with its "hood" and "horn," the use of which for pollination is not clear, the author describes the generative cell of the pollen-grain and the process of division. Then follows a full description, with figures, of the formation of the pistil, embryo-sac, and ovule. The papillose surface on the summit is regarded as an abortive stigma (comparable to that in *Apocynaceæ*), the stigmatic surface being now transferred to positions below the head.

G. H.

Asparagus Sprengeri and A. Duchesnei. By Ch. Pynaert (*Rev. Hort. Belge*, xxviii. No. 3, p. 60; coloured plate of the second species).—This latter was received from the Congo. It has longer branches and is a better decorative plant than the former, which it somewhat resembles.—*G. H.*

Astilbe Davidii. By Sir J. D. Hooker (*Bot. Mag.* tab. 7880).—Nat. ord. *Saxifragaceæ*, tribe *Saxifrageæ*. Native of China &c. The stem has an inflorescence 4–6 ft. high, with a brown, tomentose rachis. The branches, numerous, spiciform, 4–5 ins. long, of dense globose panicles of minute, rose-pink, sessile flowers.—*G. H.*

Aubrietias, Some New (*Garden*, No. 1644, p. 343; 23/5/03).—Aubrietias are so important in the spring garden and early rock garden that it is a gain to have the good new varieties that have lately been raised. These seem to divide themselves into two classes: namely, those

that aim at intensity of colour, and those of less violent colour, which have more excellent qualities in other ways.

The fine purple raised by Dr. Mules and known by his name will probably be the favourite flower with those who judge of the merit of a colour by its strength and vivacity. Another named 'Fire King,' of an intense magenta-crimson, will also find admirers.

But looking at the type *Aubrietia deltoidea*, and considering the varied beauties of a bed of seedlings of a good garden strain, those whose eyes have been trained to a keen sense of colour-beauty feel more satisfaction in tints ranging round the actual type colour, and in those variations that are lighter rather than darker.—*E. T. C.*

Azalea indica, var. **'Mlle. Emma Eeckhaute.'** By Ch. P. (*Rev. Hort. Belge*, xxviii. No. 2, p. 25 ; with col. plate).—A large double form with carmine flowers striated with crimson below, radiating into a broadish white border. It appeared as a sport on 'Mme. L. Eeckhaute.'—*G. H.*

Bamboos in the South of England. By S. W. Fitzherbert (*Garden*, No. 1644, p. 349 ; 23/5/03).—No plant is dowered with such delicate grace of form as the Bamboo, and, though some species far exceed others in elegance, none of the family is without decorative value. They are practically hardy, far hardier than was imagined on their first introduction to our islands, and, where shelter is provided, will withstand severe frost without harm. A wind-swept site is, however, fatal to the beauty of the Bamboo, which has a miserable appearance where it is exposed to the full force of biting gales. Some species, such as *Arundinaria nobilis* and *A. Falconeri*, generally lose the majority of their leaves in the winter, but in exceptionally sheltered spots, such as Penjerrick, near Falmouth, *A. nobilis* retains its foliage, and may be seen there over twenty-five feet in height in full beauty in the month of March, when the rooks are building in the leafless Elms in the background. At Menabilly this Bamboo is equally fine, and *A. Falconeri* rivals it in height.—*E. T. C.*

Banana Anthracnose. By F. M. Bailey (*Qu. Agr. Journ.* xi. December 1902, p. 402).—Reference is made to destruction caused to the Banana crop by *Glœosporium musarum*, Cke. & M. This pest was first observed in 1887. It is most destructive to the Banana crop, all the diseased fruit should be destroyed, and, as far as possible, not allowed to be shipped from port to port for sale, and so spread the disease. The fruit when affected is found to contain a quantity of treacle-like substance in the centre.—*M. C. C.*

Begonia (double) var. **Marmorata.** By Fréd. Burvenich père (*Rev. Hort. Belge*, xxviii. No. 11, p. 241 ; col. pl.).—This has a remarkably large flower ; the petals have a scarlet-crimson border with streaks on a white ground.

Begonia hybrida Reichenheimi (*Begonia rubella* × *B. heracleifolia*). By Gustav Bartsch (*Gartenflora*, p. 207, fig. 25 ; 15/4/03).—A figure and brief description of this new hybrid. The seedlings were very difficult to raise and of very slow growth, but leaf cuttings of the plants

grow vigorously. The flowers are coloured like Apple blossom and about an inch in diameter.—*J. P.*

Begonia, New. By O. K. (*Rev. Hort. Belge*, xxviii. No. 6, p. 136, photo.).—*B.* 'Buisson rose' (Lemoine). It is a hybrid between *B. diversifolia* (summer) and *B. polyantha* (winter). Hence it flowers from October to January.—*G. H.*

Begonia 'Perle Lorraine.' By O. K. (*Rev. Hort. Belge*, xxviii. No. 7, p. 145; col. pl. and photograph).—This is a hybrid by Lemoine, between *B. polyantha* and *B. dædalea*. It is very floriferous and of a rose colour. It blossoms from January to April.—*G. H.*

Boronia tetrandra. By E. Bedinghaus (*Rev. Hort. Belge*, xxviii. No. 3, p. 49; coloured plate).—The author describes it as one of the most beautiful of the sixty species. It was introduced from Australia in 1824. The flowers are rose-coloured or rose-purple.—*G. H.*

Brachychiton acerifolium (Flame Tree). By Ed. André (*Rev. Hort.* March 1, 1903, pp. 108–9; coloured plate).—Description of a very beautiful Australian tree which bears an abundance of panicles of scarlet inflorescence at the branch terminals, 10 to 20 feet high. Not hardy.

C. T. D.

Bramble, The (*Chambers's Journal*, May 1903).—The climbing properties of the familiar Bramble are interesting. The stems of the Bramble are furnished with strong hooked prickles, which arise from the skin and not from the wood. By means of these hooked prickles, the Bramble supports itself in a tangled thicket, and will sometimes reach a height of twelve or fifteen feet. The tips of the shoots also will root into the soil, and a new individual will be formed. A Bramble plant will be able to advance by means of these new growths at the rate of twenty feet a season, and may cross an obstacle such as a ten-foot wall during the same period. A similar instance occurred at Heckfield Gardens, Hants, some years ago, when Mr. W. Wildsmith had charge. Some 'Lady Downes' Vines, growing in a vinery largely composed of glass, threw long shoots which reached down to the soil on the other side. By way of experiment Mr. Wildsmith had these pegged down. In due time they put forth roots, and when well established he severed the main stems close to the border on the side on which the Vines were originally planted, and, in spite of the topsy-turvy process, the Vines, though literally on their heads, flourished and bore good fruit.—*R. D.*

Brassocattleya × Leemaniæ (*Orch. Rev.* p. 57, fig. 15; Feb. 1903.—The figure of this striking hybrid is well reproduced. Particulars of its origin and characteristics are included.—*H. J. C.*

Brest, Abolition of the Botanic Gardens at (*Le Jard.* March 5, 1903, p. 67).—Amongst retrenchments determined upon by the French Admiralty, it is a source of regret that the well-known Botanic Gardens at Brest are to be closed.—*C. W. D.*

Bryological Fragments. By Dr. Wilhelm Lerch (*Flora*, vol. xcii. 1903, pp. 83-101 ; 10 cuts).—The twig-leaves of *Sphagnum* show certain constant differences from the stem-leaves. In the former, each hyaline water-cell occupies a mesh in the continuous network of green chlorophyll-cells ; in the latter two or more hyaline cells may touch, and each only half fill the mesh, owing to the fission of a primitive hyaline cell ; this is termed a ' union ' (' verband '). Such unions may again be converted into continuous ' rows ' by the intervening green cells enlarging and losing their contents. The perforations of the water-cells are of two kinds ; in the leaves of the twigs the perforation is circular, due to the absorption of the membrane within an annular swelling, and retains its original shape ; the large pores on the leaves of the stems are very irregular, and are modified by progressive absorption of the cell-wall after their formation. Their character is easily demonstrated by staining with methylene blue or methyl-violet ; however the tingibility of the cell-wall varies.—*M. H.*

Bryophyllum crenatum (*Gard. Chron.* No. 839, p. 59, fig. 29 ; Jan. 24, 1903).—A newly introduced species of a well-known genus, from Madagascar. It is an attractive plant, with a panicle of flowers ; with purple calyces and yellow petals the leaves are rounded, deeply crenated, and of a greyish-green colour. This plant was described in the Journal of the Linnean Society by Mr. Baker in 1884.—*G. S. S.*

Bulbiferous Ferns, Propagation of. By Jules Rudolph (*Rev. Hort.* Jan. 1, 1903, p. 11).—A good practical note on the layering of bulbil plants produced on the fronds of some species of Ferns.—*C. T. D.*

Bulbophyllum clavatum and its allies. By R. A. Rolfe (*Orch. Rev.* p. 190, June 1903).—Particulars of this section of *Bulbophyllum* are included.—*H. J. C.*

Bulbs, The Misuse of (*Garden*, No. 1641, p. 291 ; 2/5/03).—Wild gardening is delightful when rightly done, but there are many ways of doing it wrongly, and one of the easiest is to buy hundreds of thousands of cheap bulbs and to plant them at random in wild ground without any special plan or design.

Good planting in wild ground requires as much knowledge as any other kind of gardening, *and a great deal more caution !*

If the character of wild ground is not to be destroyed, it is necessary to plant as Nature plants—never showing too many kinds of things at the same time. When Primroses are in bloom in the woods, they are nearly alone, or there may be Primroses and Wood Anemones. After them come the Bluebells, just intergrouping with the pink Campions that, for the most part, follow them.—*E. T. C.*

Cacteæ and Succulents. By F. de Laet (*Die Gart.* p. 277, March 14 ; p. 289, March 21, 1903).—The author, who is passionately fond of this class of plants and grows them as near to perfection as possible, recommends the beginner not to start with large collections, but to be satisfied with a few plants, and by degrees add more, attending to them himself,

and studying their habits, and he then feels sure there is no class of plants which compensates so well for the comparatively little trouble. When the amateur begins to distinguish between the different species, and in fact becomes a specialist, he will feel that no trouble or expense is too great to enlarge the collection and perfect his knowledge. The author next treats of the *Echinocactus*, describing the principal species and giving his observations, recommending, not a poor soil, but, on the contrary, a rich one. For *Opuntia*, *Mammillaria*, *Cereus*, *Echinocactus*, *Echinopsis*, a good loamy soil, with sand and for *Phyllocactus* and *Rhipsalis* loam and peat with sand.—*G. R.*

Cæsalpinia japonica. By Alessandro Pirotta (*Bull. R. Soc. Tosc. Ort.* 1, p. 9; January 1903).—A much-branched shrub, the natural flexibility of whose curved branches produces a beautiful effect in the flowering season from May to June. The whole plant is provided with short, thick, stout, spines, and has bipinnate leaves somewhat like the Acacia of Constantinople, and the midrib is furnished with very sharp hooks, which persist until the new vegetative growth is far advanced.

The flowers are arranged 50 together in a thyrsoid inflorescence, and possess yellow petals and reddish anthers, which show up well against the tender green of the foliage. With the author flowers have been produced for five years, and at present the plant is forming fertile seeds.

Multiplication, otherwise than by seed, is effected by means of the roots and by layering, the latter method being perferable if copious flowering is to be obtained. It has been employed with success in the experimental garden at Milan. The plant is useful not only for ornamentation, but also for forming thick impenetrable hedges.

W. C. W.

Camellia, Culture of the. By Pierre van den Bos (*Rev. Hort. Belge*, xxviii. No. 9, p. 211).—The author describes the process of budding and grafting of this plant. He adds a list of the best varieties.—*G. H.*

Camellias (*Journ. Hort.* March 26, 1903, p. 272, with a full-page engraving of double varieties).—It is suggested that a good many moderate-sized plants, well covered with flowers, are to be preferred to one or two giants which monopolise the whole central bed of a conservatory.

C. W. D.

Campanulas, Tall Bellflowers. By Rev. C. Wolley Dod (*Gard. Mag.* n. 2576, p. 168; 14/3/03).—The finest of the tall-growing Campanulas for the open borders are described, with notes on their culture. The synonymy of the various species is given, which is valuable to the amateur and nurseryman alike. A good illustration is given of the beautiful *C. lactiflora*.—*W. G.*

Campanula Vidalii. By S. W. Fitzherbert (*Garden*, No. 1641, p. 297; 2/5/03).—This *Campanula* is entirely distinct from the rest of the genus, and, although a handsome plant, is rarely met with in gardens. It was discovered by Captain Vidal on a small island in the Azores in 1851, so that it has been in cultivation for more than fifty years. It is of shrubby habit, forming a woody stem 9 inches to 1 foot in height, which

at that distance from the ground throws out numerous branches, some of which become elongated into flower-spikes. These often attain a height of 2 feet, and vigorous specimens about 3 feet high furnished with several blossoming flower-spikes present a most attractive and uncommon appearance. It is valuable for conservatory decoration, being of very distinct habit, and associating well with such subjects as are in flower in July and August.—*E. T. C.*

Cannas from Seed. By Jules Rudolph (*Rev. Hort.* Feb. 16, 1903, p. 93).—To obtain flowers six months from sowing, the seeds are sown at the end of January, either in river sand, sandy peat, or coal cinders, burying very shallowly about 1 centimetre apart. They are then covered with chopped sphagnum, put into warmth *upon* the pipes, and watered frequently. They generally show in three weeks, and are potted in thimble pots (8 centimetres) in Geranium soil mixed with one-third peat, the pots being placed near the glass in a hothouse. Repot middle of March, watering well and giving air, and pot on as required, the flowers forming at next shift.—*C. T. D.*

Caoutchouc Region of the Amazon, Ule's Expedition to the (*Not. König. Bot. Berlin*, iii. p. 224; March 1903).—A further account of *Hevea brasiliensis* and other rubber plants, with notes on the botany and geographical distribution of these and other species, on the seeds, and on various economic products met with on the journey. A price list of numerous articles of food at Juruá in 1900–1901, at the end of the paper, is worth noting.—*M. W.*

Carbonic Acid Assimilation in Submerged Plants, Some Material Influences on the. By Octave Treboux (*Flora*, vol. xcii., 1903, pp. 77–97).—The experiments were conducted chiefly on *Elodea* (*Anacharis*) in a dark room, so that the illumination by an incandescent gas lamp was constant; and precautions were taken against heating. Various substances were added to the water, and the rate of assimilation estimated by the classic method of counting the gas-bubbles given off in five minutes. Assimilation is reduced by the addition of neutral salts. Salts of the heavy metals, alkaloids, and anæsthetics, which in minute proportions increase respiration, have no such effect on assimilation; chloroform arrests it transitorily. All acids, when sufficiently dilute not to be harmful, accelerate assimilation. Formic aldehyde, when sufficiently dilute not to be harmful, was indifferent to the rate of assimilation as shown by the bubbles; but neither in the light nor in the darkness was any additional starch formed therefrom—a most important result on theoretical grounds.

M. H.

Cardamine, Monograph of the Genus. By O. E. Schulz (*Engl. Bot. Jahrb.* xxxii. 1903, pp. 280–416; 24/4/1903).—A general account of the morphology of the genus is followed by a discussion of its affinities, geographical distribution, and the hypothetical origin of its subdivisions. The larger part of the paper is occupied by a systematic account of the genus and its species, with full descriptions, and notes on distribution.

A. B. R.

Carnations in the Open Garden. By W. A. Watts (*Garden*, No. 1636, p. 212, 28/3/03; 1637, p. 223, 4/4/03; 1638, p. 252, 11/4/03). No one should plant border Carnations in the spring if he can possibly plant them in the autumn, except of course to fill up any gaps in the beds which may be occasioned by the ravages of such pests as the Carnation maggot, wireworms, slugs, hares, rabbits, and other enemies with which Carnations have to contend. For this purpose it is as well, when planting in the autumn, to have a few plants of each variety kept in reserve to meet contingencies. These can be put in any spare corner of the garden and carefully labelled.

The best site for Carnations is an open, airy place which gets plenty of sun, but at the same time it should not be too much exposed to strong winds. A good loamy soil suits the plants best, preferably one rather inclined to be heavy than light. Do not choose too hot a position, where the plants will get scorched up in summer, nor yet a damp, low-lying one.—*E. T. C.*

Carya olivæformis, Chalazogamy in. By F. H. Billings (*Bot. Gaz.* xxxv. No. 2, p. 134, and fig.).—Referring to the discovery of Nawaschin (*Bot. Centralbl.* 63; 353, 1895) that the pollen-tube in *Juglans regia* does not enter the micropyle, but passes down the ovary wall and enters the ovule through the chalaza, he shows that the same occurs with the Pecan fruit. The figure shows the pollen-tube descending the style, passing the orthotropous ovule, till it enters the placenta at the base. It then turns up abruptly through the nucellus into the embryo-sac.—*G. H.*

Caryopteris Mastacanthus. By Louis Tillier (*Rev. Hort.* Jan. 1, 1903, pp. 15–17; one woodcut).—Highly recommended as a hardy, compact shrub, rising to five feet, flowering profusely in the late autumn. Flowers violet. Easily raised from seed; sows itself in the open. There is a white variety, but the flowers are less abundant, less lasting, and the white is not pure.—*C. T. D.*

Catalpa, The Hardy. By William L. Hall and Hermann von Schrenk (*U.S.A. Dep. Agr. Bur. Forestry, Bull.* n. 37, 1902).—From a purely commercial point of view the hardy Catalpa must be considered as one of the most valuable trees that have been introduced to Southern Iowa, Nebraska, and Eastern Kansas. It is easily propagated, grows rapidly, and produces an excellent lasting timber that can compare favourably with any other, whether for the purpose of fencing, railway work, or the erection of telegraph and telephone lines. This bulletin is divided into two main parts: (1) The hardy Catalpa in commercial plantations, and (2) The diseases of the hardy Catalpa. In the first Mr. Hall deals very clearly and lucidly with the cultivation of the tree, including the best methods of treatment, soil and growth conditions, and the relative amount of heartwood, sapwood, and bark. Taken together, the whole points out that in the hardy Catalpa we have one of the most useful trees for extensive planting.

The diseases of the tree are not passed by, and the many excellent illustrations of these convey a very clear idea of what is equally plainly conveyed in the text.—*A. D. W.*

Cauliflorous Plants. By S. H. Koorders (*Ann. Jard. Bot. Buit.* Ser. II. vol. iii. 1902, pp. 81–91 ; 11 figs.).—Illustrations and brief descriptions of some tropical woody plants producing their flowers on non-foliaged shoots emitted from the old parts of the main trunk, some of the species being at the same time geocarpous.—*P. G.*

Celmisias (*Journ. Hort.* April 2, 1903, p. 290 ; with an engraving of *C. coriacea*).—*Celmisia* contains thirty-four good species, mostly from the temperate Pacific Islands. They are of doubtful hardiness. Some of them endure winter fairly well in the southern counties. The best for the English climate are *C. Lindsayi* and *C. spectabilis*.—*C. W. D.*

Celsia Arcturus, Jacq. By F. de Biévre (*Rev. Hort. Belge*, xxviii. No. 8, p. 169 ; col. pl.).—The genus is only different from *Verbascum* by the absence of the fifth stamen. This species bears handsome spikes of large golden-yellow flowers.—*G. H.*

Chemical Stimulation and the Evolution of Carbon Dioxide. By E. B. Copeland (*Bot. Gaz.* xxxv. Nos. 2, 3, pp. 81 and 160).—Experimenting with a variety of substances, it was found that in individual cases a rapid elongation of the primary roots of seedlings resulted from the action of Bi, Cr, In, Se, Te, Hg, Bo, Pb, W, Co, and Cu. This abnormally rapid growth was frequently followed promptly by death. As the compounds of these elements began to enter into solution, their first action on the plant was that of stimulants ; when these same compounds became more concentrated, they became distinctly, often fatally, toxic.

The general conclusions, from the numerous experiments described in detail, were, that no poison has been found *not* to act as a stimulant. Metallic salts drive CO_2 from carbonates in the cell sap. This pseudo-respiration, under the action of strong poisons, is many times as active as the real respiration, and makes the study of the latter impossible. CO_2 is given off from filtered sap (*Elodea*) much more rapidly than from the plant before injury. The stimulation by K salts is greater than that by Na salts, in about the proportion of their relative toxicity. A considerable evolution of CO_2 is a feature of the breaking down of "protoplasm" into mere "proteid," in death.—*G. H.*

Chermes piceæ, Biology of. By O. Nutzlin (*Nat. Zeit. Land-Forst*, i. pp. 25–33 and 59–67, 1903 ; 15 figs.).—Recently our knowledge of Spruce gall aphis, Larch aphis, and other species of conifer-frequenting *Chermes* has been considerably added to. Professor Nutzlin (Carlsruhe) has specially followed the life-history of the above species. The paper opens with a useful summary of previous observations. The full life-history of most of the species of *Chermes* occupies two years, one winter and spring being passed on the Spruce, and the other year on Larch, Silver Fir, or Pine ; five generations are produced—three wingless and two winged, the latter being those which effect the transfer from the Spruce to another conifer, and *vice versa*. Nutzlin's principal result is the discovery of the sexual generation of *Chermes piceæ* (which is figured). He also shows that (1) this species lives entirely on species of

Abies in Central Europe, especially *A. Nordmanniana*; (2) the generations which in other species of *Chermes* form galls on Spruce are either absent or as yet unobserved; (3) its life-history is purely parthenogenetic, the sexual generation being functionless. Details of the damage done to Nordmann's Fir are also given.—*W. G. S.*

Cherry Trees, Disease of (*Die Gart.* p. 375, May 9, 1903).—For some years the Cherry trees along the Rhine have shown signs of decay, even young trees having an unhealthy appearance. Experts have found that the trees have suffered through late frosts exposing them to the attack of a fungus—*Valsa leucostoma*. The fungus first gets a footing at the small branches of the frozen wood and slowly spreads to other parts, ultimately killing the whole tree. Cutting away the branches affected with the disease when in its early stages, and putting tar over the wound, will often save the trees from destruction.—*G. R.*

Chloræa, The Genus. By R. A. Rolfe (*Orch. Rev.* p. 133; May 1903).—Interesting particulars and descriptions of various species of these terrestrial Orchids are given.—*H. J. C.*

Chromosomes, Behaviour of, in Spore Mother-cells. By D. M. Mottier (*Bot. Gaz.* xxxv. No. 4, p. 250; pls. xi.–xiii.).—This is an elaborate and important paper, with three plates, illustrating the process of karyokinesis in the sexual organs of the higher plants; showing the homology of the pollen and embryo-sac mother-cells.—*G. H.*

Chrysanthemum grande. By Sir J. D. Hooker (*Bot. Mag.* tab. 7886).—Nat. ord. *Compositæ*, tribe *Anthemideæ*. Native of Algeria. This is a perfectly hardy plant. The stem is from 2–3 ft. high and leafy. The flower-heads are terminal, solitary, $1\frac{1}{2}$–2 ins. broad, with golden-yellow florets and no ray.—*G. H.*

Chrysanthemum indicum. By Sir J. D. Hooker (*Bot. Mag.* tab. 7874).—Nat. ord. *Compositæ*, tribe *Anthemideæ*. Native of China and Japan. Var. 1 is a graceful small plant, growing in coniferous forests; Var. 2 is a large straggling, fragrant plant, common in ditches &c. The heads are golden-yellow, 1 in. in diameter.

N.B.—The two figs., *Bot. Mag.* tabs. 327 and 2042, are both referable to *C. morifolium*, Ram.—*G. H.*

Chrysanthemum 'M. Leguernay.' By E. Fierens (*Rev. Hort. Belge*, xxviii. No. 12, p. 276; col. pl.).—This is a large golden-yellow variety of incurved Japanese.—*G. H.*

Chrysanthemum Shows in America. By E. Molyneux (*Gard. Mag.* n. 2566, p. 11; 3 1 03).—The writer contrasts the arrangement of Chrysanthemum shows in America with similar exhibitions in this country.

According to American ideas the object of a Chrysanthemum show is to display the flowers so that the fullest expression of beauty is derived from them. Here the practice is to arrange the flowers on boards with painful monotony, having no regard to the harmonising of the tints, and

with utter disregard of displaying the natural grace of a Chrysanthemum poised on a slender stem, with the handsome foliage to serve as a foil to the colours.

We are a conservative race, and probably the present generation will pass away before the real aim and object of a flower show is realised.

If one does occasionally see artistically arranged flowers, it is not at flower shows, but in a country house where a lady possessing taste and artistic feeling knows instinctively how any particular class of flowers should be arranged so as to display them to the best advantage both in form and colour. Let us hope that the "lessons" Mr. Molyneux has gleaned from reading about American Chrysanthemum shows will be reflected in the English exhibitions, so that a Chrysanthemum show in London upon which he has influence will be as enjoyable to the majority of visitors as those in New York and Paris, and not merely a display of "points," understood and appreciated only by the expert.

W. G.

Chrysanthemums: Revised List of the Best. By G. T. Grignan (*Rev. Hort.* April 16, 1903, pp. 186-90).—A list divided into ten groups according to various characters, and compiled by the Société nationale d'Horticulture; 430 varieties.—*C. T. D.*

Citrous Fruits, Principal Diseases in Florida. By W. T. Swingle and Herbert J. Webber (*U.S.A. Dep. Agr., Div. Veg. Phys. & Path., Bull.* n. 8, 1896; 8 plates).—The diseases described in this bulletin are: (1) Orange blight, which so far has not been traced to its cause. (2) Die-back, of which the cause is not yet thoroughly understood. (3) Sooty mould, produced by species of *Meliola* or *Capnodium*. (4) Foot-rot, or Mal di gomma, which may possibly be accelerated by the presence of *Fusarium limoni*. (5) Melanose, probably caused by some parasite, not yet determined.—*M. C. C.*

Citrus Fruit, Specking of. By Albert H. Benson (*Qu. Agr. Journ.* xii. April 1903).—After recounting that "specking" is responsible for a loss of from 2 to 50 per cent. on fruit shipped during the season, it proceeds to determine the cause as that of infection by a mould fungus, under the name of *Penicillium digitatum*, which causes the softening and rotting of a portion of the skin of the fruit. This mould is said to be confined to Citrus fruits, and spreads very rapidly when it once makes its appearance. It is recommended to leave no mouldy fruit on the ground or on the tree, and always to gather and destroy it when the mould is in the white stage, and before the spores are developed. Also to see that the skin of the fruit is perfectly dry prior to packing. Experiments are about to be made during the current season as to the possibility of treating the skin of the fruit without injury to the fruit itself, so as to render it impervious to attacks of the mould fungus.—*M. C. C.*

Clerodendron myrmecophila. By Sir J. D. Hooker (*Bot. Mag.* tab. 7887).—Nat. ord. *Verbenaceæ*, tribe *Viticeæ*. Native of Singapore. This is a sparingly branched shrub, about 3 ft. high, with leaves 1 ft. long. The panicle is terminal, many-flowered; corolla of an ochreous-red colour, and red ascending filaments.—*G. H.*

Codlin Moth, Spraying for. By Professor A. B. Cordley (*U.S.A. St. Bd. Hort. Oregon, Report* 1901–2, p. 118; illustrations and tables).—A long and valuable article is here given, the subject being treated most thoroughly. The writer questions the theory that the moth has three or four broods annually. The description and life-history are given, and the effects of temperatures on habits. Descriptions are given of the egg, the larvæ, and the pupa. Its natural enemies also receive attention. Tables are given showing the relative effects of early and late spraying, views of spraying apparatus at work, and illustrations of Apples and bark attacked by the moth. The conclusions arrived at are, that the codlin moth is the most serious Apple pest; the eggs are deposited principally on the surface of the fruit, and not in the calyx. Birds are the most effective natural aids in controlling the moth, and spraying with one of the arsenites is the most practical method of protecting the fruit. Persistent and intelligent spraying should give 85 to 90 per cent. of fruit trees free from worms.—*V. J. M.*

Coffea robusta (*Bull. Bot. Dep. Trinidad*, No. 38, p. 533; April 1903).—A note in praise of the flavour of this new coffee, which is found to be a productive and good kind for lowland cultivation.—*E. A. B.*

Coloured Glasses, Influence of, on the Red and Yellow Pigments in Plants. By Emile Laurent (*Rev. Hort. Belge*, xxviii. No. 11, p. 243).—M. Overton showed by experiment that an excess of glucose caused a reddening. The author experimented with *Telanthera versicolor*, of a pronounced red foliage, in two frames with red and two with blue glass, and one with clear glass, uncoloured. None of the glasses were monochromatic. Under red and blue glass the leaves of normal dimensions were all *green*; after a month the leaves were smaller.

A variety of *Coleus* with large leaves, green at the base and red-violet towards the apex, bore normal leaves under the clear glass, but under the red and blue glasses the leaves diminished in size by degrees, and the coloured parts became more and more reduced. The flowers were green.

Similar results occurred with species of *Perilla*, *Alternanthera*, and *Achyranthes*. Zonal Pelargoniums became entirely green under red and blue glasses.

The result proved that a brilliant light favours the colorisation of foliage, and can easily be shown in purple-leaved trees &c., the colouring matter of leaves, as of flowers, depending on matters assimilated by the leaves.

Of trees with golden leaves, used in experiments, were the Elder, Spiræa, Syringa, Privet, &c. When badly illuminated such become green.

Red glass provoked an etiolation in three species; but the Elder and Syringa were completely green.

Under blue glass the stems were short, but the leaves of Elder and Syringa were well greened.

These experiments proved that the yellow pigment, like the red, is also a product of assimilation.—*G. H.*

Corn Breeding, Methods of. By C. G. Hopkins, Ph.D. (*U.S.A. Exp. Stn. Illinois, Bull.* 82 ; 12 / 1902 ; 2 figs.).—It is pointed out that of one bushel (56 lb.) of maize the germs weigh 4½ lb., the dry starch 36 lb., gluten 7 lb., bran 5 lb. The darker coloured horny layer, about 65 per cent. of the whole grain, contains a large proportion of the total protein content ; the white starchy part (about 20 per cent. of the whole) contains only a small quantity of protein ; the germ (about 10 per cent. of the whole), while rich in protein, contains 85 per cent. of the total oil content of the grain. It is easy to make an approximate estimation of the composition of the grain by simply cutting it across the middle, and comparing the proportionate size or quantity of germ or of white starch in the grain. It is found that while the variations in composition of grains taken from different ears of the same variety of corn is considerable, the variation in the grains of the same ear is very slight ; *e.g.* the protein content of the individual grains from one ear varied between 12·14 per cent. and 12·71 per cent., while from another ear of the same variety the variation lay between 8·02 per cent. and 9·02 per cent. Thus grains from the same ear can be reasonably depended upon to give fairly constant results. Chemical selection may also be carried out. The best place for a breeding plot " is in a larger field of corn planted with seed which is as nearly as possible of the same breeding as that planted in the breeding plot itself." The alternate rows should be completely detasselled, and the seed corn taken from these rows. Selection is carried on in the field, seed not being kept from any dwarf or otherwise undesirable plants.—*F. J. C.*

Cratægus, The Genus, in Newcastle County, Delaware. By C. S. Sargent (*Bot. Gaz.* xxxv. No. 2, p. 99).—The author describes nineteen species and varieties of this genus.—*G. H.*

Cydonia Sargenti (*Wien. Ill. Gart.-Zeit.*, April 1903, p. 129).—A coloured illustration is given under this name, which appears to be none other than our familiar friend *Pyrus Maulei*, described by Dr. Masters in 1874. According to the Editor of the Vienna Journal, who also recognises its close relationship (*sehr nahestehend*) to *P. Maulei*, *Cydonia Sargenti* was received from the Arnold Arboretum, U.S.A., by M. Victor Lemoine of Nancy and named by him in compliment to the distinguished Director of the Arboretum, and thus a new element of confusion has been added to the nomenclature of this highly ornamental shrub. Rightly referred in the first place by Dr. Masters to *Pyrus*, following Bentham and Hooker, who had included in it the Tournefortian genus *Cydonia*, it soon became better known in gardens as *Cydonia Maulei* than as *Pyrus Maulei*. It is certain, however, that the plant first became known to science about the year 1866 through the Russian botanist Maximowicz, who named it *Pyrus japonica alpina*. In 1890 it was rechristened *Chœnomeles alpina* by the German dendrologist Dr. Koehne, and this name is retained by Dr. Leopold Dippel of Darmstadt in his " Handbuch für Laubholzkunde," published in 1894, and also by some later authors. Where are these incessant changes in the names of familiar plants to stop ? Can we wonder that horticulturists should grumble and refuse to adopt new names even when they are strictly right ?—*A. H. K.*

Cypripedium, Hardy, with Illustrations. By O. Jacobs (*Die Gart.* pp. 409–411; May 30, 1903).—Why has no hybridiser with plenty of leisure tried to cross the hardy *Cypripedium* with the greenhouse species and forms, and so raise varieties—not more beautiful, for the hardy ones are quite as pretty as the tropical—but to raise a race with flowers more lasting and freer flowering? The best hardy Lady's Slippers are: *C. acaule* with pink flowers; *C. Calceolus* (British plant), with yellow lip and brown sepals and petals; *C. spectabile*, the finest of all, white, with bright rosy lip; *C. parviflorum* and *pubescens*, brown with yellow lip; *C. macranthon*, deep purple-crimson, as far as the better Siberian form is concerned; *C. guttatum*, white with crimson markings; *C. arietinum*, white and pink; *C. montanum* white, and brownish; *C. candidum*, white. Excepting *C. Calceolus*, *macranthon*, *montanum*, which grow best in clay or loam, they grow invariably in peaty soil or leaf-mould in a semi-shady position, sheltered against wind, and fairly moist. A covering of leaves during the winter is advisable.—*G. R.*

Dahlia as a Garden Flower, The. By James Hudson (*Garden*, No. 1644, p. 347; 23/5/03).—It requires no great effort of memory to carry one's thoughts back to the time when the list of Dahlias was confined to what are termed 'Shows,' 'Fancies,' and 'Pompons.' Dahlias at that time were regarded from the exhibition standard only. For some years past, thanks to the advent of *Dahlia Juarezii*, we have progressed immensely in our views of the Dahlia as a decorative garden flower. Great credit is undoubtedly due to our raisers of new and greatly improved forms of the so-called Cactus Dahlia. These have added immensely to the attractions of the garden from early in August until the frosts. Pompon Dahlias are also useful for decorative purposes, though they appear somewhat formal to some. In a cut state they will travel well and keep fresh for a long space of time. Single Dahlias, both the ordinary and the Cactus forms, are excellent garden flowers, very profuse in flowering and with greatly varied colours. Show and fancy Dahlias do not appeal to the garden-lover so much as to the enthusiast who looks upon them more from the florist's standpoint and for their utility for the show-board.—*E. T. C.*

Dahlia, 'Les Alliés.' By Fréd. Burvenich père (*Rev. Hort. Belge*, xxviii. No. 11, p. 252; col. pl.).—This is a large-flowered 'Cactus,' of pale rose, streaked irregularly with crimson.—*G. H.*

Dahlias, New Cactus. By R. Dean (*Gard. Mag.* n. 2576, p. 167; 14/3/03).—A descriptive list of the leading new varieties of Cactus Dahlias, numbering about thirty. The list is evidence that, when once the demand for any particular class of florist's flowers becomes established, the supply of novelties is prolific.—*W. G.*

Darwinism in Horticulture. By P. Hariot (*Le Jard.* April 5, 1903, p. 102). An interesting summary of the researches and theories of Darwin in regard to the vegetable world.—*C. W. D.*

Date-leaf Boat of Arabia. By D. G. Fairchild (*Bot. Gaz.* xxxiv. No. 6, p. 451; with three photos).—Through the great scarcity of wood,

the natives of the harbour of Jask make small flat-bottomed boats entirely of the midribs of leaves of the Date Palm, about 10 ft. in length.—*G. H.*

Davallia bullata, Wall. By A. v. d. H. (*Rev. Hort. Belge*, xxviii. No. 10, p. 228; col. pl.).—It was introduced by Wallich to Kew from Nepal in 1852.—*G. H.*

De Laet, Frantz. By M. Hesdörffer (*Die Gart.* p. 309, March 28, 1903).—An interesting account of how Mons. de Laet, who is a great authority on and one of the most successful growers of *Cacteæ*, became a Cactus specialist. About twenty years ago, in passing the flower market of Antwerp, he saw a florist who was offering, among other Cacti, *Mammillaria bocasana*, and having never seen such a Cactus before he bought a large specimen and five smaller ones. Not being the possessor of a greenhouse, they were placed in his office, and in this way he began the formation of his now unique collection. The office and balcony becoming in time too small for the ever-growing collection, he transferred them to Contich, near Antwerp, and at present his Cacti are grown in six large greenhouses and 200 metres of frames, which now contain everything worth growing in the Cactus line.—*G. R.*

Dendrobiums, A Group of Hybrid (*Orch. Rev.* p. 112, fig. 22; April 1903).—Photographic illustrations and descriptions and records of *D.* × *Ellisii* var. *Wiganianum*, *D.* × 'Sibyl,' *D.* × *Chlorostele* var. *Owenianum*, *D.* × *Wiganiæ*, and *D.* × *melanodiscus* var. *pallens* are included. *H. J. C.*

Dendrobium spathaceum. By R. A. Rolfe (*Orch. Rev.* p. 176; Jun 1905).—Description and historical particulars of this interesting botanical species.—*H. J. C.*

Dendrobium Williamsoni and D. cariniferum. By R. A. Rolfe (*Orch. Rev.* p. 142; May 1903).—Interesting particulars of description and habitat are given, also historical notes.—*H. J. C.*

Deutzia corymbifera. By Fréd. Burvenich père (*Rev. Hort. Belge*, xxviii. No. 7, p. 157; col. pl.).—This plant bears rosy-white flowers and was introduced to commerce from North China in 1897.—*G. H.*

Deyeuxia. By Ch. Pynaert (*Rev. Hort. Belge*, xxviii. No. 5, p. 97, with coloured plate).—The author describes *D. elegans variegata*, the leaves of which have golden-coloured margins.—*G. H.*

Diatomaceæ, On Colourless Pyrenoids and Coloured Elæoplasts in. By C. Meraschowsky (*Flora*, vol. xcii. 1903, pp. 77–83; 4 cuts).—The pyrenoids are usually immersed in the chromoplast and are consequently coloured, the elæoplasts free and colourless. But in some cases the pyrenoid is wholly or partially free from the chromoplast and colourless, and again the elæoplasts may be immersed and coloured, or even themselves have a coloured plasmic envelope to the central oil globule. Elæoplasts may be classified as (*a*) 'Sparsioplasts,' inconstant in size and number: (*b*) 'Stabiloplasts,' constant; and the latter again

as (1) 'Placoplasts,' adjoining or immersed in the chromoplasts, and (2) 'Libroplasts,' free along the median line.—*M. H.*

Dichorisandra (?) Thysiana. By Ch. Pynaert (*Rev. Hort. Belge*, xxviii. No. 6, p. 133; col. pl.).—This was collected from the Congo. There is a doubt as to its true generic name. The leaves are glossy and large. It has not yet flowered.—*G. H.*

Diervilla Middendorffiana. By Sir J. D. Hooker (*Bot. Mag.* tab. 7876).—Nat. ord. *Caprifoliaceæ*, tribe *Lonicereæ*. Native of Mongolia, Manchuria, and Japan. This is a glabrous shrub with black bark. Leaves 2–3 ins. broad. Cymes 3 ins. across, of pale yellow flowers, the lower lobe speckled with orange.—*G. H.*

Dipladenia. By Ad. Van den Heede (*Rev. Hort. Belge*, xxviii. No. 6, p. 130).—The author describes the genus, and gives details of culture and habit.—*G. H.*

Disa Kewensis (♀ grandiflora × ♂ tripetaloides). By G. Bornemann (*Gartenflora*, p. 57, plate 1510; 1/2 03).—A coloured plate and very brief description of the hybrid.—*J. P.*

Diseased Plants: Cases of Recovery under Cultivation. By P. Hennings (*Zeit. f. Pflanz.* xiii. pp. 41–45; 1903).—Observations on cases of plants attacked by rusts, smuts, and other parasitic fungi, which have thrown off the disease. The plants were diseased when planted, but after a few years' cultivation in the author's botanic garden became healthy.—*W. G. S.*

Dismal Swamp Region, Botanical Survey of the (*U.S.A. Dep. Agr., Div. of Botany, Cont. from Natl. Herb.* vol. v. 6, xi./1901; 13 plates, 14 figs., 2 maps).—The region surveyed was that part of South-east Virginia and the adjacent portions of North Carolina which constitute the district known as the Great Dismal Swamp. Two main objects were kept in view during the investigation: (1) largely economic—"to ascertain in what degree the character of the native vegetation of the region, varying to a certain extent on different soils, may serve as an indication of the quality and value of the soil"; (2) purely scientific—to study the "ecological distribution of the vegetation—in other words, of the various local assemblages in which the different species and forms are combined to form the plant covering of the region as a whole." The climate is "as a whole highly favourable in all essential respects to the vigorous growth of . . . such plants as are not especially equipped to endure any kind of extreme conditions." There is a long growing period, a mild winter, abundant sunshine, heavy and well distributed rainfall, and a high and remarkably uniform percentage of atmospheric moisture. The physiography of the district is next dealt with, then the soil. The maritime plant formations include the salt-marshes and sand-dune regions, while the inland include both non-hygrophile and fresh-water regions. The "associations" in the salt-marsh formations are *Spartina stricta* association, at the immediate edge of the water; *Juncus Roemerianus*, just within the *Spartina* belt; the

Typha association, near the upper limit of the brackish waters; and the *Spartina patens* association, here and there in the *Juncus* association. The sand strand is divided into the beach and outer dunes, with a sparse vegetation of *Cakile* and *Salsola Kali*; the middle dunes, with *Ammophila arenaria* and *Panicum amarum* and thickets of *Myrica carolinensis* in the higher parts, as well as many climbers, such as *Tecoma*, *Vitis*, &c., a very diversified herbaceous flora occurring in the depressions among the sandhills; and the inner wooded dunes, mostly bearing an open forest of *Pinus Tæda* and a few deciduous trees, together with *Ammophila*, *Panicum*, *Cyperus*, and *Galium hispidulum*. On the inner side of these dunes, away from the sea, there is a dense low undergrowth of mainly woody species, such as *Sassafras*, *Zanthoxylum*, &c.

The inland formations comprise mixed forest with various Pines (particularly *P. Tæda*), *Liquidambar*, *Quercus* sp., and numerous other trees and shrubs; Pine barrens, tracts of open Pine woods with a dwarf carpet of herbaceous plants; cleared-land formations (not cultivated), including arboreous associations (chiefly species of *Quercus* and *Fagus*), shrubby associations (*Rhus*, *Rubus*, *Sassafras*, and Lianas), and herbaceous associations (principally of *Andropogon virginicus* and Composites); cultural formations, including field crops (Potatos, Cabbages, &c., Cereals, Cotton, Forage Plants, Peanuts), cultivated trees (Apples, Peaches, Cherries, Pears, shade trees), weeds.

The fresh-water formations include the hygrophile forest, comprising the 'Black Gum' swamp, covered with heavy deciduous forest, *Nyssa biflora* predominating, accompanied, however, by numerous other species of deciduous trees, woody Lianas, Ferns, and herbaceous perennials, and the 'Juniper' swamp, covered with the White Cedar (*Chamæcyparis thyoides*), occurring on the periphery of the Great Dismal. The following associations also occur in the 'Juniper' swamp: The ericaceous (shrub) association; the canebrake associations, consisting mainly of *Arundinaria macrosperma*; the *Woodwardia-Sphagnum* association, occurring here and there in the more open parts of the wooded swamp. The reed-marsh formation consists largely of *Typha-Sagittaria* associations, especially along the rivers, while along the edge of the forest the *Scirpus-Eranthus* association forms broad tracts, at one time covered with forest, while the low marsh formation is occupied by the *Rynchospora-Eleocharis* association in which Sedges predominate.

Aquatic vegetation is represented by *Myriophyllum*, *Utricularia*, *Castalia*, &c.

The report also includes notes on adaptations to environment found in the various groups, lists of all plants collected or observed during the progress of the survey, and notes upon their geographical distribution and upon market-garden crops.—*F. J. C.*

Dissotis Mahoni. By Sir J. D. Hooker (*Bot. Mag.* tab. 7896).—Nat. ord. *Melastomaceæ*, tribe *Osbeckieæ*. Native of Uganda. The whole plant is hispidly hairy. Leaves, opposite, 1–1½ in. long. Flowers solitary 2 ins. broad, with rose-purple petals.—*G. H.*

Dogs and Horticulture. By A. Buyssens (*Rev. Hort. Belge*, xxviii. No. 5, p. 109; with 3 photos).—Besides artisans of all kinds who

employ dogs in Gand, they are much used by horticulturists for drawing carts with flowers in pots. Besides using dogs by day, they are employed as guardians at night. One illustration shows a large dog within a high wheel which it turns for pumping water.—*G. H.*

Double Glass to Houses. By Eug. de Duren (*Rev. Hort. Belge*, xxviii. No. 2, p. 26).—The author regards a layer of air between the glasses as valuable in hindering the loss of heat from within the house. By an ingenious electrical experiment by M. Schoentjes, it is found that for double glasses the practical rule is that they should be eight centimetres apart.—*G. H.*

Echinops, Globe Thistles. By Rev. C. Wolley Dod (*Gard. Mag.* n. 2570, p. 69; 31/1/03).—A collective account of the Globe Thistles in cultivation, with historical notes. There is a confused synonymy attached to these plants, but this article goes far to elucidate it. As a fact, only one or two species are grown in a general way, *E. Ritro* especially, and this happens to be the finest of the genus.—*W. G.*

Education, Horticultural: Outline of Greenhouse Laboratory Work. By S. B. Green (*U.S.A. Exp. Stn. Minnesota, Rep.* 1902; 58 figs.).—An outline course of instruction, twenty-two lessons, in horticultural operations: a suggestive series of practical exercises worthy the perusal of every gardener.—*F. J. C.*

Electric Light, Effect of, in Forcing Lilacs. By Ch. Grosdemange (*Rev. Hort.* March 1, 1903, p. 117).—With a light of eighteen candles, without reflector, M. Lucien Harancourt has cut flowers in fifteen days in lieu of twenty-five, as under ordinary treatment. Description of general treatment. *Coleus*, *Pelargonium*, and *Ageratum* were also brought on much more rapidly under the influence of the light.—*C. T. D.*

Eriostemon myoporoides. By E. Bedinghaus (*Rev. Hort. Belge*, xxviii. No. 8, p. 180; col. pl.).—An Australian plant with narrow-lanceolate leaves and white flowers. The author adds details upon the cultivation. *G. H.*

Eryngiums (Sea Hollies). By Rev. C. Wolley Dod (*Gard. Mag.* n. 2574, p. 136; 28/2/03).—The writer reviews the species in cultivation and comments upon their merits as garden plants, selecting the finest as border plants. The confusion of identity of *E. amethystinum* and *E. Oliverianum* is explained, and other Eryngos are mentioned as worthy the notice of the cultivator. A good illustration of *E. alpinum* accompanies the article.—*W. G.*

Erysiphaceæ, Infection-powers of Ascospores in. By Ernest S. Salmon (*Journ. Bot.* 485, pp. 159–165, & 486, pp. 204–212; 5 & 6/1903). A description in some detail of experiments showing the liability of Barley to infection by the ascopores of *Erysiphe Graminis*.—*G. S. B.*

Ethereal Oils: their Significance in Xerophytes. By Carl Detto (*Flora*, vol. xcii. 1903, pp. 147–199; 7 cuts).—The author examines

the functions which have been ascribed to these products. Tyndall's view, that they served to check excessive heating by the opacity of their vapour to ultra-red rays, is improbable; the effect would be null during wind, which accompanies the intense midday heat of deserts, and though it might be thought to reduce cooling by radiation on calm clear nights, the amount of vapour present under natural conditions is too small to produce Tyndall's opacity. H. Dixon's view, that the function of essential oils is to check transpiration, is examined and found to depend on their presence in vapour, which is inoperative in quantities which are not harmful; the action observed is due to the injection of the intercellular spaces, so that evaporation is limited to the stomates instead of extending to the whole of these spaces. The author regards the function as protective against omnivorous plant-feeders, such as mollusks and herbivorous mammals, and justifies his view by a careful series of experiments. Incidentally he refutes the supposed protective function of the mimicry of the Stinging-nettle by the Dead-nettle, which is *a priori* improbable, as herbivora select mainly by smell, not sight, and non-existent, as rabbits and snails have no hesitation in feeding on the latter and rejecting the former. Haberlandt's explanation of the mechanism of the superficial glands of *Rutaceæ* is dealt with at some length and extended by a description of these in *Dictamnus* (Dittany).—*M. H.*

Eucalyptus cultivated in the United States. By Alfred James McClatchie, M.A. (*U.S.A. Dep. Agr. Bur. Forestry, Bull.* n. 35, 1902).—It will be news to many that the Australian Eucalypts are more extensively planted than any other exotic forest tree in the South-Western United States.

In this excellently got-up account of the fully fifty species of *Eucalyptus* cultivated in America they are viewed mainly from the standpoint of their usefulness, ornamental qualities being, however, incidentally discussed. The uses of these trees are so many that to discuss all would be quite out of place in an abstract like the present. Suffice it to say that, whether for the value of the timber produced, suitability of the trees for dry arid situations, or as a source of many valuable gums, resins, and oil, they probably stand unrivalled amongst foreign introductions to the American coast.

The illustrations of the various species render this bulletin of great value for reference purposes, while the ample descriptions combine to place the work as second only to the scholarly "Eucalyptographia" of Baron Ferdinand von Müller.—*A. D. W.*

Eupatorium petiolare. By Ed. André (*Rev. Hort.* Feb. 16, 1903, p. 77).—A new introduction from Mexico, highly recommended as a winter-flowering shrub; not hardy; flowers white, in panicles, but apparently rose-tinted, owing to abundance of pink threads which appear between the buds. Delicately perfumed like the winter Heliotrope (*Nardosmia fragrans*).—*C. T. D.*

Euphorbia obesa. By Sir J. D. Hooker (*Bot. Mag.* tab. 7888).—Nat. ord. *Euphorbiaceæ*, tribe *Euphorbieæ*. Native of South Africa.

The entire plant is 5 ins. high, obovoid-oblong, crossed with bands of pale purple striæ, eight-ribbed.—*G. H.*

Exochorda Alberti macrantha. By J. Foussat (*Rev. Hort.* Jan. 1, 1903, pp. 18, 19 ; one woodcut).—A hybrid shrub, by Lemoine, between *E. grandiflora* and *E. Alberti*. Inflorescence abundant, the branches appearing to be covered with snow. There is an editorial footnote that M. F. Morel, Lyon-Vaise, had previously made the same cross with the same results under the name of *E. Alberti grandiflora*, and hence is entitled to priority. A further note by F. Morel appears in *Rev. Hort.* Feb. 1, 1903, pp. 64, 65 ; two woodcuts. He considers *E. Alberti* and *E. grandiflora* to be merely geographical variants of one species, and his hybrid (?) arose by mere association of the two forms. Plants raised from the seed present little variation among themselves or from the immediate parents.

C. T. D.

Fagræa, Extra-floral Nectaries in. By A. Zimmermann (*Ann. Jard. Bot. Buit.* vol. iii. pp. 1–7 ; 1901).—A description of the structure, distribution, and development of the nectaries on the leaves of certain species of *Fagræa*.—*P. G.*

Farmyard Manure, its Value (*U.S.A. Exp. Stn. Ohio Bull.* 134).—Farmyard manure is relatively deficient in phosphoric acid. Kainit and gypsum each added to this manure prevented the escape of ammonia, but the addition of phosphatic material gave the best results, used as an absorbent in the stable, thus securing intimate mixture with the manure in its fresh condition.—*C. H. H.*

Fatty Degeneration: a new type of disease in plants. By E. Laurent. (*Rev. Hort. Belge*, xxviii. No. 4, p. 75).—The author describes the appearance of yellow spots on the leaves of *Kentia* and other Palms, giving them the appearance of being variegated. They are due to a fatty degeneration of the cholorphyll granules, in consequence of an excessively damp atmosphere.—*G. H.*

Fermentation and Putrefaction. By George Massee, F.L.S., V.M.H. (*Journ. Q.M.C.* April 1903).—A popular explanation of the phenomena of fermentation : dealing with the Yeast Fungi, or *Saccharomycetes*, and their influence in fermentation ; and with the Bacteria, or *Schizomycetes*, and their association with putrefaction ; ending with a reference to the plant diseases which are caused by bacteria, and especially to a Potato disease now prevalent in the United States.

M. C. C.

Ferns with coloured Foliage. By A. v. d. H. (*Rev. Hort. Belge*, xxviii. No. 4, p. 77).—This contains references to or descriptions of a considerable number of species of yellow, white, striated characters &c.

G. H.

Fertilisers for Flowers. By C. W. Ward (*Proc. Soc. Am. Flor.* 1902, p. 27). To get the best results with chemical fertilisers employ soil rich in vegetable fibre.

For greenhouse plants liquid fertilisers are most convenient; seven formulæ are given, all of which have been tried and found satisfactory. To quote one used for Rose-growing (the other formulæ being similar save that phosphate of ammonia, dried bone, bone black, sheep manure, and nitrate of potash are employed):

Superphosphate	130 lb.
Sulphate of ammonia . . .	13 ,,
Nitrate of soda	31 ,,
Sulphate of potash . . .	26 ,,

Use at the rate of 1 oz. to 1 gallon of water; apply once each week at the rate of two quarts per square yard of surface. This is done until the plants have taken on a heavy growth, at which time the quantity and the time of application are regulated according to the needs of the plant. In applying liquid chemical fertilisers the plant should have become well established before application is begun. First applications should be weak and at considerable intervals until active growth shows that the fertilisers are being assimilated.

Liquid manure made from pulverised sheep manure, about the consistency and colour of strong tea, makes an excellent fertiliser.—*C. H. H.*

Fertilisers, Use of Commercial. By Dr. G. M. Tucker (*U.S.A. St. Bd. Agr. Missouri*, vol. ii., n. 7, p. 4, 1902).—To find out what a soil needs in order to grow a good crop, apply nitrogen, phosphoric acid, and potash separately to small pieces of land and grow the crop on them. If either one of these elements gives an increase in yield, it shows that that element is lacking; or two elements may show an increase; then these two should be added in future cultivation. Usual commercial fertilisers do not contain vegetable matter, which is an essential of productive soil. Continual cropping reduces the vegetable matter, and if farmyard manure is not used, green crops must be ploughed in; the best of these are Clovers, Cowpeas, and Beans.—*C. H. H.*

Ficus radicans variegata. By Ch. Pynaert (*Rev. Hort. Belge*, xxviii. No. 2, p. 37; with col. pl.).—The variegated leaves of this plant are dark green down the middle, with a golden border.—*G. H.*

Flora of Ferro. By J. Bornmüller (*Engl. Bot. Jahrb.* xxxiii. 1903, *Beibl.* 72, pp. 1–14; 13/3/1903).—The author describes a new species of *Senecio* (*S. Murrayi*) from this island, and gives a brief general account of the flora of this small member of the Canary group, and "the most western point of the old world."—*A. B. R.*

Florideæ, Development of (*Beih. Bot. Cent.* xiv. ht. 1, p. 1, 1903). Dr. F. Tobler describes the early stages of *Ceramium, Dasya, Callithamnion, Polysiphonia*, and other red Algæ. There was no prothallium-like stage in their development.—*G. F. S.-E.*

Forest from Seed, How to grow a. By F. W. Rane (*U.S.A. Exp. Stn. New Hampshire, Bull.* n. 95, November 1902).—This may best be described as an excellent *résumé* of the raising of forest trees from the time the seed is collected until the young trees are planted out

permanently. Where and how to obtain seed, collecting, drying, storing, sowing, and transplanting the progeny, are all subjects that are clearly and lucidly dealt with. The reproductions of seedlings in various stages of growth, from photographs, do much to make the subject matter clear; while the illustrations of native Pine and Hemlock show well how harvesting operations are carried on in the forest.—*A. D. W.*

Forestry in Sweden (*Journ. Hort.* Jan. 22, 1903, p. 78).—The forests in Sweden cover about 30,000 square miles: of this area 20,000 are under State scientific management.—*C. W. D.*

Forestry, Report of the Departmental Committee on. By W. R. Fisher (*Gard. Chron.* No. 840, p. 66; Jan. 31, 1903).—A very good *résumé* of this report is given in this article. "The committee considers that the world is rapidly approaching a shortage, if not an actual dearth, of coniferous timber, which constitutes about 85 per cent. of the total British timber imports," and points out that there are in Britain about 21 million acres of uncultivated land, much of which might be afforested. As it is desirable that improved methods of growing timber should be carried out, the committee have made some valuable suggestions on this point. They suggest that the Alice Holt wood in Hampshire and an area to be selected in Scotland should be set apart as demonstration areas for foresters and others. "The student foresters will work in the woods under a director who will teach forestry, and an assistant who will teach forest botany and entomology, as well as the constitution and properties of soils." They also propose lectureships at Oxford and Cambridge Universities, and that lectures should also be given at all Agricultural Colleges that receive grants from the Board of Agriculture; that a State Forest School for the Empire should be founded at one of the Universities; and finally that "the attention of Corporations should be drawn to the desirability of planting with trees the catchment areas of their water supply, which Birmingham is already proposing to do."—*G. S. S.*

Forests of Rhode Island. By F. W. Card (*U.S.A. Exp. Stn. Rhode Island, Bull.* n. 88, October 1902).—The great importance of the forests of Rhode Island may be inferred from the fact that, approximately, 400 square miles, or 40 per cent. of the entire area of the State, may be included as woodlands proper. White Pine, Chestnut, and Oak predominate, while Maple, Walnut, and Ash are found in considerable numbers, and in 1900 the total lumber product of the State amounted to 18,000,265 feet, and thirty-three sawmills were established. There are excellent illustrations of trees in blocks, some of which are of special value as pointing out the benefits accruing from timely and judicious thinnings.

The hardy Catalpa would appear to be a tree well worthy of introduction to the State forests, the timber being remarkably durable, and the rate of growth rapid.—*A. D. W.*

Formaldehyde, Effect upon Germination of Oats. By F. Cranefield (*U.S.A. Exp. Stn. Wisconsin, Rep.* 1902).—Oats steeped in

a solution of formaldehyde containing $2\frac{1}{2}$ parts to 1,000 of water showed a decrease in germination of 6·4 per cent. to 17·4 per cent as compared with untreated seed, while stronger solutions caused greater injury; but in spite of this the author recommends the continuance of the practice of steeping the seeds in order to destroy the spores of the smut fungus.

F. J. C.

Formaldehyde, Influence of, on growth of White Mustard. By MM. Bouilhac and Giustiniani (*Comp. Rend.* May 11, 1903).—A series of experiments were conducted with the object of ascertaining whether members of the higher plants could obtain a certain amount of hydrocarbon from formaldehyde (formalin). Seedlings of White Mustard (*Brassica alba*) were properly arranged in flasks with their roots immersed in half a litre of mineral nutrient solution. A solution of formaldehyde, 25 in 100 of water, was used. Quantities of 3, 6, 10, and 20 drops of this solution were added to the nutritive solution contained in the different flasks, and special arrangements were contrived to prevent the loss of formaldehyde through evaporation. The seedlings thus treated were placed in a subdued light with the object of checking the assimilation of aërial carbonic acid. After the expiration of three days the plants showed no signs of having suffered from the presence of the poison, and chemical reagents showed that the whole of the formaldehyde had been removed from the nutrient solution: it had in fact been absorbed by the plants.

The experiments were commenced on March 10, and up to May 6 an equal number of drops of formaldehyde were added to each flask every third day as was given in the first instance.

At the conclusion of the experiments it was observed that those plants provided with twenty drops of formaldehyde every third day had evidently suffered from the poison, whereas those plants furnished with ten drops every third day were larger, more vigorous, and heavier than check plants kept under similar treatment, save that no formaldehyde was added to the nutritive solution.

Judging from these experiments, the author concludes that formaldehyde in certain proportions exercises no injurious action on White Mustard, but on the other hand furnishes the plant with an amount of nutrition, in the form of a hydrocarbon, when growing in obscure light where assimilation by chlorophyll is difficult.

A second series of experiments, in which the plants were placed in almost total darkness, resulted in the death of the whole; thus proving that a certain amount of light is necessary to enable White Mustard to assimilate formic aldehyde.—*G. M.*

Fruit and Vegetable Storage and Shipment. By Prof. W. A. Taylor (*U.S.A. Hort. Soc. Virginia Report*, 1902, p. 17).—Wrapping the Bartlett Pears in paper before packing in boxes increased their value in London. The Pears need to be picked before ripe and properly stored; these were refrigerated.

In the case of Peaches it was found that refrigeration was unnecessary and distinctly unprofitable; each fruit was wrapped in parchment paper.

Freshly dug Sweet Potatos arrived in better condition than those kiln-dried.—*C. H. H.*

Fruit Culture in Montana (*U.S.A. St. Bd. Rep.* 1902).—This report gives an excellent idea of the growing industry of fruit-growing in Montana, of the means of inspecting nursery and orchard stock and fruit, and of the methods adopted when infection is discovered.—*F. J. C.*

Fruit Garden, The Home. By L. C. Corbett (*U.S.A. Dep. Agr. Farmer's Bull.* 154, figs.).—To quote the bulletin itself: "The fruits best suited to the various sections of the United States cannot be enumerated here, and this bulletin will be confined to a brief discussion of the methods of propagation, planting, pruning, and general culture."

It mentions regretfully that the enormous growth of commercial orchards and the establishment of experiment stations by the Department of Agriculture during the last twenty-five years have apparently removed all inducement from most amateur gardeners to grow fruit either for their own consumption or for the interest of testing new varieties. It points out how much can still be done both profitably and pleasantly in either of these ways by the amateur, and gives lists and diagrams helpful to those wishing to make the most of a small space.—*M. L. H.*

Fruit-growers, Practical Suggestions for. By H. P. Gould (*U.S.A. Dep. Agr., Farmers' Bull.* No. 161, 1902; illustrated).—In this bulletin the author briefly discusses the practical principles of fruit-culture, and considers in turn: Location (including transportation facilities, temperature, aspect, &c.), Selecting and Planting the Stock, Pruning, Fertilising, Cover Crops, Tillage and Marketing the Product, strongly emphasising the necessity of the grower becoming acquainted with the market he wishes to supply in order to have the same standard of grade and quantity, and also pointing out the great benefit to a fruit-grower of a good reputation as regards quality and packing with his commission agent, whom the author calls "an essential adjunct to commercial fruit-growing."

The latter, and perhaps most interesting, part of the pamphlet is devoted to the spraying problem, and several illustrations of pumps and spraying machines are given.

Spraying is considered from the two points of view of a fungicide and an insecticide, the former constituting, as it it were, an insurance of the crop.—*C. H. C.*

Fruit Plantations, Sites for. By T. Coomber (*Gard. Mag.* n. 2568, p. 42, 17.1.03).—This is a matter of such serious consideration that the views of every practical cultivator are worthy of attention. The present writer deals with such primary points as soils, shelter, elevation, aspect, and soil preparation. These points are undoubtedly important to the intending planter, but it must be borne in mind that the advice of any one practitioner must be accepted subject to circumstances, varying as they do in every square mile in these islands, so that it is not always a matter of choosing a site where all the conditions are fulfilled, but of selecting a site where the conditions most nearly approach the ideal. A

person who is continually being brought face to face with the problem of selecting sites is he who is most fully aware that an ideal site is seldom met with.

Soil must be accepted as it is; it can only be slightly altered by artificial means. Elevation and aspect afford more scope for choice. Shelter is in most cases impracticable, for with effectual shelter there must be necessarily (unless it be from natural conformation of surface) shade and forest-tree roots to contend with, two of the worst conditions for successful fruit-tree culture.—*W. G.*

Fruits, Revised Catalogue of (*U.S.A. St. Bd. Hort. Oregon Report*, 1901–2, p. 106; tables).—Most exhaustive tables are here given of such cultivated species, commonly designated "hardy" fruits, as have developed distinct varieties which are propagated on a commercial scale by some of the various methods of bud propagation. Columns are given showing name, size, form, colour, flavour, quality, season, use, and origin. Some 300 varieties of Apples alone are given—followed by Peaches, Pears, Cherries, Plums, &c.—*V. J. M.*

Fruit Trees, Planting of, along public roadways in Germany. (*Bull. R. Soc. Tosc. Ort.* 3, 4, p. 102; March–April 1903).—From 1897 to 1901 an average of 5,000 marks a year was obtained from the fruit grown in this way, which obtains chiefly in Franconia and the Palatinate of the Rhine, where local and climatic conditions are more favourable than elsewhere. Apples and Pears are most commonly planted, then Cherries, and here and there Plums and Walnuts. They are maintained by the public exchequer. Of the 6,788 kilometres of public roadways about 1,030, or 15·2 per cent., are flanked with fruit trees. The percentage varies from 5·1 in Upper Bavaria to 26·8 in Upper Franconia. The number of plants in the kingdom amounts to 166,342. From 1897 to 1901 there were planted in Bavaria 17,555 fruit trees at a cost of 38,831 marks. The young plants were in part purchased, in part taken from the State nurseries. Three tables are given providing the above and many other details of the report on the subject presented by the Royal Italian Legation to the Prince of Monaco.—*W. C. W.*

Fruit Tree Notes: Horticultural Society, Virginia State.—The proceedings included the reading and discussion of papers on a great variety of subjects, among which were :—

The regrettable destruction of American forests.
Why some orchards fail.
Better methods of orcharding.
Packing and handling of Apples, Pears, and Strawberries.
The treatment of fungous diseases on fruit trees.
Transportation of fruit.
Evaporated fruits.
Experiments in spraying for bitter rot.
San José scale in Apples and Peach-tree borers.
The best varieties of Apple for a commercial orchard.
Canning, and experimental export fruit shipments.

The official reports of the Standing Committees of the Society on Plant Pathology, Entomology, Stone Fruits, Vineyards, and Small Fruits and Vegetables were also read and discussed. The opinion of the meeting was divided on the advantage or otherwise of terracing orchards on rough mountain land, but the majority of speakers seemed to agree that it made cultivation easier, and diminished the chances of the soil washing down after heavy rain.

All through the discussions the great importance of cultivation among fruit trees was always being insisted upon except by one speaker, who quoted a case where prize fruit was grown in an orchard in the north which had not been cultivated for a hundred years, but in which the grass was cut every year at hay-time, piled up round the trees and left to rot. It seemed to be generally felt that some further legislation is required to check the spread of San José scale, which threatens seriously to cripple the important industry of Apple culture in the United States, and which is being spread wholesale by infected nursery stock. The Department of Agriculture has introduced a bill providing for a small sum to be spent yearly on the official inspection of orchards and young stock, and individual States have powers to order the destruction and disinfection of stock that is known to be infected; but it seems to be felt that the law is not yet drastic enough to cope effectually with the disease.

Thorough spraying is insisted on as the only remedy for all disease and as a great preventive of some. Bordeaux mixture should be used for fungous diseases, and Paris green for those caused by insects.

A mixture of lime, sulphur, and salt is said to be efficacious in keeping San José scale in check, but is not quite powerful enough to eradicate it.

To make the mixture, use 40 lb. fresh unslacked lime, 15 lb. salt, 20 lb. sulphur, 60 gals. water.

Slack the lime, mix with the water, and boil, stirring in the salt and sulphur. Go on boiling for an hour and a half, or until the sulphur is dissolved. When thoroughly mixed apply hot, while the trees are in a dormant state.

The varieties of Apple recommended for market purposes were 'Albemarle Pippin,' also known as 'Yellow Newtown,' 'York Imperial,' 'Ben Davis,' 'Gano,' 'Winesop,' 'Staymen,' 'Mammoth Black Twig,' 'Virginia Beauty,' 'Grimes' Golden,' and 'Jonathan.'

The Peaches recommended were 'Greensboro,' 'Early Rivers,' 'Champion,' 'Carman,' 'Crawford Early' and 'Crawford Late,' 'Elberta' (the most popular Peach in cultivation), 'Salway,' and 'Bilyues Late.'

Growers are given their choice among these, but are strongly recommended not to plant too many varieties. Two or three are quite enough when it comes to picking and getting to market, unless the grower means to sell in his nearest town, when it might possibly be safe to plant six or eight varieties.

Pears are not so extensively cultivated in Virginia at present as they probably might be, and 'Kieffers' are recommended as a variety. They are best pollenised from some other variety, preferably 'Garber.' In planting Strawberries for market the great thing is, of course, to find out what sorts do best in each locality, but 'Excelsior,' 'Crescent,' 'Tennessee,' 'Clyde,' 'Brandywine,' and 'Gandy' are all to be recommended. 'Bell,' 'Bril-

liant,' 'Campbell Early,' and 'Stark' are valuable among new Grapes, 'Pride of Ohio' and 'Maxwell Early' among Raspberries, and 'Fay,' 'Victoria,' and 'Wilder' among Currants.

The Vegetable Committee reported, as the result of experiments at the test farm at Saxe, that among choice varieties those best suited to Middle Virginia were 'Black-seeded Simpson,' 'Boston Market,' and 'Iceberg' Lettuce; 'Columbian,' 'Crimson Globe,' and 'New Unnamed' Beet; 'Enormous,' 'Honour Bright,' and 'Extra Early' Tomatos; 'Sure Head,' 'Danish Round Head,' and 'Marvin's Savoy' Cabbages; 'Dry Weather' Cauliflower; 'Rose Ribbed,' 'Golden Self-blanching,' and 'Winter Queen' Celery; 'Kleckley' Water-melon; and 'Pedigree' and 'Rocky Ford' Canteloupes.

There was much discussion in the course of the meetings on the subject of packing fruit, and the growing Californian habit of packing Apples and Peaches either in bushel boxes, unwrapped or wrapped in paper like Oranges, was warmly recommended to Virginian growers. The enormous flat-dwelling population of New York can store a box of Apples when a barrel would be quite out of the question in their limited space, while the fruit in the smaller package arrives in better condition and fetches higher prices, even deducting the extra cost of preparing for market. So far opinion among buyers for the trade in England is divided as to the greater saleability of the new style of package for Apples; but tables with columns for style of package, and net price per package, net proceeds per package, and per cent. of gain are given to show what a promising opening there is for the export of Peaches and Pears in boxes to England.

Whatever the style of package, however, the necessity of a uniform standard of grading is strongly urged, and whatever standard may be adopted, or whatever the grades may be called, the size of fruit in each should be quite uniform; the fruit in the higher grades should be perfect in shape and free from worms; grade number, variety of Apple, and grower's name should be stamped on the outside of each package, and should invariably be a sufficient guarantee to the buyer that he is getting fruit of the quality he expects. An account was given of experiments in preserving fruits and vegetables in tins, and the recipes found most successful with Tomatos, Apples, Small Fruit, Indian Corn, and Beans were given. Great care and cleanliness are necessary in the factories to minimise the risks from mould spores or bacteria; and, in order to ensure the wholesomeness of the preserved food, the use of chemical preservatives is strongly deprecated.

At the end of the report are printed lists of various sorts of fruit trees and bushes, giving a description of each under headings for colour, use (kitchen market, dessert, &c.), and season; and marks for quality and suitability to various sections of the State of Virginia.

The publication is provided with a good index, which, however, by some mistake of printer or binder surely, stops at the letter "L."

M. L. H.

Fruit Tree Notes: Horticultural Society, Peninsular, Transactions of (Jan. 1903; plates).—A series of instructive papers by members of the society, which as a body is fully persuaded that the future in

agriculture and horticulture is with the highly trained and scientific expert, and that the old-fashioned half-educated farmer, with his slipshod ways, his unobservant fatalism, and his misused farming implements rotting in the corners of his fields, is a menace to his neighbours and foredoomed to failure.

The State is generously doing its part in America in providing or assisting agricultural education and in carrying out scientific and experimental work, and it is for the younger generation of farmers to take advantage of what is being done for them, and to see to it likewise that the business side of their profession is managed with the same intelligence, the same practical common sense, and the same straightforward honesty as make for success in any other branch of trade.

But, given men with the necessary training and a real love of their work, and these speakers, at all events, are fully persuaded that there is not only health and enjoyment but fortune also to be made off the land in Delaware, Maryland, and Virginia.

For such a man these papers are full of hints, suggestions, and useful maxims; for example:

"Low temperature makes fine fruit. Select stock for planting that has been propagated from stock known to be healthy and above the average of its kind in size, colour, and productiveness. The law of transmission is just as potent in the vegetable as in the animal kingdom. Don't grow Peaches on wet soil. On receiving young trees in the autumn, lay them up in a trench where water cannot stand, and at an angle of 45 degrees above the ground. Plough the land to be planted as early as practicable in spring, prepare it nicely, and set the trees at just the depth they grew in the nursery.

"Remember that fruit trees need air drainage as much as water drainage. Trees planted in a pocket at the end of a valley or with surrounding forest trees will never thrive."

"Cultivate orchards, but don't grow Strawberries, Drilled Corn, or Sorghum as a cover crop. Tomatos, Potatos, Melons, and Indian Corn may all be grown, Tomatos for choice out of this list, but Crimson Clover is best of all.

"Plums are more reliably profitable than Peaches, but only some varieties will resist rot in the moist climate of the Peninsula.

"Grade your fruit by a fixed standard and pack it attractively, but above all fairly and straightforwardly." All this was preached with men's own experience as text and illustration.

This last question of the proper packing of fruit for immediate sale, for export, and for cold storage is receiving a good deal of attention in America, and experiments are being made in delivering ripe summer Apples, Sweet Potatos, Pears, and Peaches in London, with encouraging results.

An account of the cold storage investigations undertaken by the Department of Agriculture is given, but these have not yet lasted long enough to produce much result. However, it has been shown already that fruit, to keep satisfactorily, must be stored as soon as possible after picking, and that a temperature of 32 degrees is the one which produces the best results.

Hints are given in another paper on the best time and method for picking and packing fruit intended for cold storage, and one or two speakers mentioned what a difference good roads make, in the appearance and keeping qualities of fruit that has to be carted to market. That prolific pest, the San José scale, is also the subject of a paper, and the best and most effective remedies for it are said to be coal oil and the lime, salt, and sulphur wash, to be applied only when the trees are dormant.

A soap emulsion with oil may be made as follows: One gallon of boiling water, half a pound of soap cut into thin slices, two gallons oil. Stir hard till they mix. Add five gallons of water for a 25 per cent. emulsion, and a weaker solution is not advised when the trees are dormant. When they are in leaf a 15 per cent. emulsion may be used. The formula for the lime, salt, and sulphur mixture used on the Pacific coast is as good as any, and is as follows: Unslacked lime 40 lb.; flour of sulphur 20 lb.; common salt 15 lb.; and water enough to make 60 gallons. Take 10 lb. lime and 20 lb. sulphur, and boil thoroughly in 20 gallons water over a good fire for an hour and a half, or until the sulphur is dissolved. Stir frequently while boiling. The mixture should become a clear amber colour. Thoroughly slack the rest of the lime with hot water, add 15 lb. salt while still boiling, and stir until the salt is entirely dissolved. Add the two mixtures together and boil half an hour. Add hot water enough to make 60 gallons. Use while hot, straining through fine-meshed wire gauze before pouring into pumps.

There is a lecture by Dr. L. O. Howard, State Entomologist, which was illustrated by lantern slides, on some efforts which are being made to introduce the appropriate insect antidote to the insect pests which have been accidentally imported into the United States.

Novius cardinalis is being imported to prey on *Icerya Purchasi*; *Apanteles glomeratus* to destroy the imported Cabbage worm; *Entedon epigonus* to fight the Hessian fly; *Scutellista cyanea* and *Erastri ascitula*, both of which prey upon the black scale of the Olive.

An enemy to the dreaded San José scale seems to have been found in *Chilocorus similis*, from North China, and the Algerian *Blastophaga grossorum*, once at home in the San Joaquin Valley, is adding a new source of production to California by fertilising the Smyrna Fig.

A series of plates illustrates the history of the conversion of 100 acres of rocky hilly land in the Connecticut Valley into a thriving Peach orchard, and three more show how a gum swamp became a Strawberry garden.

The Peach trees are all low-headed, their grower finding that this low heading, which he does to all his trees, makes a difference of 60 to 75 per cent. in the cost of labour for pruning, thinning, and picking. No ladder is ever used in his orchards, and he calculates that one third of his Peach crop can be gathered by a man sitting on the ground. The report is provided with an excellent index.—*M. L. H.*

Fumago. By X. (*Rev. Hort. Belge*, xxviii. No. 11, p. 260).—The disease described is called *Fumagine*, and is due to a combined attack of *Hemiptera* and the ascomycetous fungus *Capnodium* or *Fumago*. The

disease has been studied by M. B. Cointre. Several species of insect are included in the above. A full description of the effects is given, and the remedy by sulphate of copper and other mixtures.—*G. H.*

Fungi, Injurious, on cultivated plants in German East Africa. (*Not. König. Bot. Berlin*, March 1903, iii. p. 239).—Hennings describes over a dozen species belonging to the genera *Asterina*, *Microthyrium*, *Phusalospora*, *Ascochyta*, *Glœosporium*, *Helminthosporium*, &c., brought by Zimmermann and by Stuhlmann. It is interesting to see types well known in Europe reappearing in the colonies, even if as different species.

M. W.

Fungi, Recent British. By M. C. Cooke (*Trans. Brit. Myc. Soc.* 1902).—Amongst other species described in this communication is *Glœosporium Bidgoodi*, on leaves of *Odontoglossum*, which was exhibited at the Scientific Committee, and notified (*Journ. R.H.S.* xxvi. pp. cxxxix and cxli), but not named or described. Also *Fusarium lini*, attacking Flax seedlings in Ireland, and causing 'Flax wilt'; also *Coniothecium Questieri*, a black mould parasitic on Apple leaves; and the recent destructive disease of Potato tubers and Beetroot, known as *Œdomyces leproides*. Other species described belong chiefly to the *Agaricini*.

M. C. C.

Fungus, Parasitic, on Grasses. By G. Massee (*Gard. Chron.* No. 836, p. 14, fig. 7; Jan. 3, 1903).—This fungus, which is nearly related to the 'smut' of Corn, has been imported into this country with seeds of *Bromus unioloides* from Patagonia, a grass grown in that country for fodder. The fungus was found to be a new species, and has been named *Cintractia patagonica*. This genus at one time was included in the genus *Ustilago*, of which the 'smut' fungus is a member, but that genus is now reserved for those species which have loose spores like the 'smut.' In *Cintractia* the spores form small ball-like masses, which do not break up until they have passed through the alimentary canal of some animal, or the seeds which are infested by them have rotted on the ground. Mr. Massee says: "It will be interesting to note whether host, or parasite, or both, can establish themselves in this country. There are plenty of species of *Bromus* and *Festuca* in Britain to choose from if the fungus is desirous of trying a new host plant."—*G. S. S.*

Galanthus, New Species of. By S. Arnott (*Gard. Mag.* n. 2569, p. 53; 24 1 03).—The writer describes two new Snowdrops, *G. Elsæ* and *G. Rachelæ*, though the descriptions do not afford means of comparing the novelties with older species. Both appear to flower in late autumn, November and December, or a month in advance of our native Snowdrop.

Of late years there has been such a numerous increase of species and varieties of Snowdrops, and some of them so nearly allied botanically and so much alike to an ordinary observer, that the time has come for a complete monograph of the genus, which would be invaluable if recorded in some accessible publication.—*W. G.*

Grafting by Approach. By Raymond Roger (*Rev. Hort.* Feb. 16, 1903, pp. 91–93; 2 woodcuts).—Description of some curious cases where fruit trees, their trunks being damaged, have been restored and vigorous growth induced by the insertion of branches from a neighbouring tree. In one case a Peach tree was thus saved by the introduction of an Almond sucker from the stock of a grafted Peach at some distance.—*C. T. D.*

Grape, Investigations concerning Self-sterility. By S. A. Beach and N. O. Booth (*U.S.A. Exp. Stn. New York, Bull.* 223, 224; 12/1902; plates 2 and 6).—The first of these bulletins gives the result of experiments on the potency of the pollen of self-sterile Grapes and the influence on self-fertility of girdling or bending the canes, while the second is a study of Grape pollen. It was found that the pollen of varieties of Grapes which are self-sterile usually fails to fertilise other self-sterile varieties, but in some instances was not altogether impotent. In some cases girdling, or bending the canes sharply before the blossoms open, stimulated imperfectly self-fertile or self-sterile varieties to increased productiveness, but in other varieties no such result was observed. The girdled vines sometimes failed to heal their wounds.

It appears that self-sterility in Grapes is due usually to a lack of potency in the pollen. The distinction between potent and impotent pollen is readily seen under the microscope, where the former grains appear symmetrical and blunt at the end, and the latter irregular in shape. In certain varieties the pollen is mixed, and it is found that "the amount which germinates is approximately in proportion to the potent forms present."

"Pollen was germinated . . . three weeks after it had been gathered in California." Full details of the methods employed and of the results of the various experiments are given.—*F. J. C.*

Grape-must, The Manufacture and Preservation of unfermented. By George C. Husmann (*U.S.A. Dep. Agr. Bur. Pl. Ind., Bull.* No. 24; 6/11/1902; illustrated).—After touching on the use of unfermented Grape-juice by the ancient Greeks and giving the composition of the Grape and causes of fermentation, the author describes the two different methods for preventing fermentation in use in California and in the Eastern States.

Both methods depend upon the principle of heating the juice to at least 165 degrees F. in order to destroy the spores and germs which cause fermentation, and in both a continuous pasteuriser is used.

By the first the product is generally white or yellowish, owing to the immediate separation of the juice from the skins, whereas in the second the crushed Grapes undergo a heating and stirring process before the final pressing, by which means a dark-coloured liquid is produced, resembling red wine without containing any alcohol.

Both systems are liable to the same defects, viz. that the must is frequently not clear, and that it sometimes has a scorched, disagreeable taste. Besides this, in many cases the produce is placed on the market in too large bottles, much of it thereby spoiling before it can be used.

The author concludes with the uses and value of unfermented

Grape-juice, a simple method for home manufacture, and some useful recipes.—*C. H. C.*

Grape, The, in Oregon. By Professor E. R. Lake (*U.S.A. St. Bd. Hort. Oregon Report*, 1901, p. 209; illustrations).—Soil and location, planting, varieties, cultivation, pruning and training, pests, &c. are treated of. Many varieties are described, with dates of maturity &c. The paper is of course chiefly valuable to local growers, but good information is given. Illustrations show the fruiting Worden vine, fruiting Niagara vine, fruiting Concord vine, all in fourth year; also a stump-trained vineyard and the pole trellis system of training.

It appears that the 'Black Hamburgh,' 'Sweetwater,' and 'Muscat' are not well adapted to the climate.—*V. J. M.*

Growth without Oxygen (*Beih. Bot. Cent.* xiii. ht. 3 and ht. 4). Herr A. J. Nabokich discusses his experiments and answers the criticisms of Professor Dr. Wieler (who replies in the second paper) and others.

His method of culture is by growing Sunflower hypocotyls in flasks which have been exhausted by an air-pump and then sealed (the medium having been heated in a vacuum or in a water-bath).

The researches given in this paper show that a very distinct elongation is perceptible in the absence of oxygen, but that practically no effect is produced by traces of oxygen (less than 0·06 per cent.). The effects of temperature, of the individuality and character of the mother plant, of the duration of the experiments, and of the use of sugar solutions or water in the experiments are investigated by series of experiments. He also found that when seeds are germinated in an atmosphere deprived of oxygen a reduction of nitric acid is observed, although bacteria are absent from the substratum and the seeds. The chief interest of the paper lies in showing that the anaërobic method of life followed by many bacteria can also be adopted on emergency by the cells of the higher plants.—*G. F. S.-E.*

Guatemala, Undescribed Plants of. By J. D. Smith (*Bot. Gaz.* xxxv. No. 1, p. 1).—This consists of full descriptions of thirteen new species of as many genera, including *Zamia Tuerckheimii* (Donn.), Sm., of which a double plate is given.—*G. H.*

Hamamelis japonica. By A. Kort (*Rev. Hort. Belge*, xxviii. No. 3, p. 61).—The author refers to *H. arborea*, Ott.; *H. persica*, DC. (or *Parrotia persica*, C. A. Mey). The above species has insignificant flowers, appearing in October. A figure of *H. japonica* var. *Zuccariniana* is given.—*G. H.*

Hamamelis mollis. By Sir J. D. Hooker (*Bot. Mag.* tab. 7884).—Nat. ord. *Hamamelideæ*. Native of China. Only three species are known, *H. virginiana*, Eastern U.S.; *H. japonica* of Japan. This is a large bush or small tree, 30 ft. in height. Leaves 4–5 ins. long, orbicular-obovate. Flower-heads sessile; calyx tomentose; petals $\frac{1}{3}$ in. long, golden-yellow.—*G. H.*

Hamamelis, or Witch Hazels. By W. T. (*Gard. Mag.* n. 2569, p. 54 ; 24/1/03).—A descriptive account, with cultural notes, of the few species and varieties of this genus of winter-flowering shrubs or small trees, which are becoming more generally known and planted. No open-air tree or shrub possesses so much interest in the dead of winter as these Witch Hazels, which have a beauty peculiarly their own.—*W. G.*

Hamamelis virginiana, L. By G. de Rocquigny-Adanson (*Rev. Hort. Belge*, xxviii. No. 2, p. 28).—The author describes this plant, introduced into France in 1743.—*G. H.*

Hardy Gardening under Glass (*Garden*, No. 1633, p. 153 ; 7/3/03).—Owners of greenhouses which for any reason are insufficiently heated for tender plants, or are not heated at all, would do well to turn their attention to this particular phase of winter gardening. Too many greenhouses are practically useless, when they might be made an unfailing source of pleasure and occupation. Given suitable plants, the one great secret of success is getting them well established, either in pans or pots in cold frames, or, in some instances, by a preliminary course of planting out in reserve quarters in the open ground, where they can be well cared for during the summer. In the case of bulbs, early potting—or repotting, according to circumstances—is of utmost importance, or again it may be the sowing of seed or the putting in of fresh cuttings at the right moment. It is just upon this point of attention to apparently trifling matters that success or failure often turns.—*E. T. C.*

Hat-stand Tree (*Bull. Bot. Dep. Trinidad*, No. 37, p. 511 ; January 1903).—*Rheedia lateriflora*, indigenous to Trinidad, branches in so regular a manner that small specimens of eight feet are often used to make hat-stands.—*E. A. B.*

Hebenstretia comosa. By Sir J. D. Hooker (*Bot. Mag.* tab. 7895). Nat. ord. *Selaginea*. Native of South Africa. This is an erect branching, nearly glabrous herb. The flowers are small, in a dense spike, 2–6 ins. long ; the corolla has a yellow tube, the limb white.—*G. H.*

Hedges. By Owen Thomas (*Journ. Hort.* March 12, 1903, p. 221). Nearly twenty hedge plants are enumerated, with remarks on the merits of each. Amongst them are Hornbeam, Euonymus, *Pyracantha*, *Garrya elliptica*, Myrobalan Plum, Roses, Sweet-brier, Lavender.

C. W. D.

Herbaceous Border, Management of. By J. Wright (*Journ. Hort.* Jan. 29, 1903, p. 89).—Superphosphate of lime is the best artificial manure, applied at the rate of a quarter of a pound to each square yard, at intervals of a month during the growing season.—*C. W. D.*

Honey and Flowers. By X. (*Rev. Hort. Belge*, xxviii. No. 5, p. 112).—The author discusses the question of the poisonous nature of honey when taken from certain plants, as the honey may include essential oils and odorous principles. Thus honey from Mount Hymettus is

collected from Labiates, as that of Narbonne has the perfume of Lavender, of Provence that of Rosemary, the flavour of that of Cuneo in Piedmont being due to Ivy. But honey may also acquire toxic or medicative properties, as that of the *Eucalyptus*. The honey of Moravia has a terebinthine taste from the bees devouring the honey-dew of the Pines.

Poisonous honey is especially characteristic of mountainous regions. Thus Alpine mountaineers have died from eating honey collected partly from the Aconite. Such accidents are very rare, as the bees prefer to frequent gardens &c.

Kalmias, Azaleas, and Rhododendrons have long been known to supply poisonous honey. *A. pontica* and *R. ponticum* were probably the species of which Xenophon wrote, describing how his soldiers were poisoned by honey, though none died. This occurred near the Black Sea.

G. H.

Hornschuchia and Mosenodendron (*Beih. Bot. Cent.* xiii. ht. 4, p. 361).—Herr Hans Hallier criticises the systematic position of these plants as regards anatomy, flower, &c. He also discusses the affinities of the *Anonaceæ*.—*G. F. S.-E.*

Hybridisation, Recent Research into the Theory of. By C. Correns (*Bot. Zeit.* April 16, 1903, No. 8, p. 114-25).—A general review of recent literature in this connection, acquaintance with Mendel's theory being presumed and De Vries' Theory of Mutation omitted pending issue of second volume and special review thereanent. Bateson and Saunders' Report specially considered as most important next to De Vries, but objection taken to new terms introduced. The publications of Tschermak, Weldon, C. C. Hurst, Strasburger, W. A. Cannon, and Millardet are reviewed and summarised. The reviewer, however, fears that unless separate definite objects are distributed to, and reported upon practically by, observers, the mass of literature is likely to lead to more confusion of ideas than real enlightenment. On the other hand, he fears that even such individual research as is recommended by Mr. Bateson would probably lead to a mass of contradictory reports which would baffle the student, and be little likely to lead to the predicted revolution in our ideas of inheritance, species, and variation.—*C. T. D.*

Hydrangeas, Blue. By Eug. de Duren (*Rev. Hort. Belge*, xxviii. No. 2, p. 38).—After alluding to various theories, it was found that by surrounding the plants with ferruginous clay and by watering them with alum a bright blue was secured.—*G. H.*

Impatiens Balfourii. By Sir J. D. Hooker (*Bot. Mag.* tab. 7878). Nat. ord. *Geraniaceæ*, tribe *Balsamineæ*. Native of the North-western Himalaya. This plant has alternate tapering leaves and panicles of rose-coloured flowers, the lower petals having a yellow base and a pale crimson curved spur.—*G. H.*

Inulase, Experimental Studies on. By A. L. Dean (*Bot. Gaz.* xxxv. No. 1, p. 24).—As *Aspergillus niger* and *Penicillium glaucum* were found to grow well in media in which inulin was the only carbohydrate,

experiments were conducted with these fungi. Descriptions of the experiments and results are given, showing that the Aspergillus powder possessed a rather stronger inulin-splitting power than the Penicillium powder. The inulase of these fungi does not pass into the culture medium ; it is therefore an endo-enzyme. The optimum temperature for inulase was about 55 degrees C.—*G. H.*

Iris Collettii. By Sir J. D. Hooker (*Bot. Mag.* tab. 7889).—Nat. ord. *Irideæ*, tribe *Moræeæ*. Native of Burma. It has a dwarf habit, persistent under cultivation. The leaves are narrowly ensiform. Flowering stems, 6 ins. high. The perianth $1\frac{1}{2}$ in. diam.; segments sub-equal, spreading, violet-blue, streaked with yellow at base; the crest of outer perianth leaves orange-yellow.—*G. H.*

Ivy, Uses of. By G. G. (*Gard. Mag.* n. 2584, p. 304 ; 9/5/03).—An excellent article upon the various uses to which Ivy may be applied in gardens, such as wall coverings, pillars, or Ivy chains on terrace banks. A selection is given, and good illustrations accompany the article.—*W. G.*

Jasminum primulinum (*Gard. Chron.* No. 848, p. 197, fig. 83; March 28, 1093).—This beautiful species, though previously known, has only just been introduced into cultivation by Messrs. Veitch & Sons, who received it from their collector, Mr. Wilson, from Yunnan. If, as it is hoped, this species proves to be as hardy as the well-known *Jasminum nudiflorum*, it will be a most welcome addition to our climbing plants. It is said that it has already withstood several degrees of frost at Coombe Wood without injury. The blossoms are nearly two inches in diameter, are semi-double, and of a bright yellow colour.—*G. S. S.*

Kalmias. By W. Dallimore (*Garden*, No. 1638, p. 249; 11/4/03). The number of species usually found in gardens is three, *K. angustifolia*, *glauca*, and *latifolia* ; two other species, *K. cuneata* and *hirsuta*, have been described, but they are very seldom seen. In addition to these species, a number of varieties of two of them are well known. In gardens that are free from lime, and especially in those in which the soil is of a sandy, peaty character, and where the Common Heather and Ling grow naturally and luxuriantly, Kalmias will find an ideal home. Where, however, lime is found in any appreciable quantity, or where the soil is very wet and heavy, they will not thrive, and it will be courting failure to attempt their culture. They make excellent subjects either for groups in the shrubbery or for beds on the lawn, for they are of neat habit, and flower with great freedom.—*E. T. C.*

Keteleeria Evelyniana. By M. T. Masters (*Gard. Chron.* No. 848, p. 194, fig. 82; March 28, 1903).—This new species of *Keteleeria* was found by Dr. Henry in Yunnan in a gorge of the Red River, about 4,000 feet above the sea. Only five or six trees were met with growing in a group, but Dr. Henry says the district was not thoroughly explored by himself or his collectors. The trees were said to be about 30 feet in height, and their aspect was singularly handsome owing to the colour of the foliage. A description of the tree is given in Latin.—*G. S. S.*

Krakatau, Flora of. By O. Penzig (*Ann. Jard. Bot. Buit.* Ser. II. vol. iii. 1902, pp. 92-113; 7 figs.).—An interesting account and illustrations of the further advance in the colonisation of this volcanic island by plants since 1883. It is shown that about 32 per cent. of the plants have reached the island by the agency of the wind, about 60 per cent. by the agency of sea currents, and about 7 per cent. have been brought by animals. There is scarcely any woody vegetation as yet.—*P. G.*

Ladybirds (*Journ. Hort.* Jan. 29, 1903, p. 106).—An engraving of the seven-spot ladybird, with a note recording the great service of the larvæ of this insect in clearing aphis from plants.—*C. W. D.*

Lælio-Cattleya 'Mrs. I. Leemann.' By G. T. Grignan (*Rev. Hort.* Feb. 1, 1902, pp. 68-70; one illustration).—Raised by M. Maron, between *Cattleya aurea* and *Lælia Digbyana*. A list is also given of numerous other successful hybrids and their origin.—*C. T. D.*

Lælia Digbyana and its Hybrids. By C. H. Curtis (*Gard. Mag.* n. 2584, p. 306; 9/5 03).—The history of this Orchid from the time of its introduction from Honduras in 1846 is given to the date on which the first hybrid from it was produced, followed by an account of the numerous hybrids that have been produced since 1889.

Considering that this Orchid in its primitive state was the least likely among its class to produce beautiful hybrids, the skill and patience of the hybridist in regard to it are a triumph in the art.—*W. G.*

Lælio-Cattleya 'Prince Leopold.' By Ch. Pynaert (*Rev. Hort. Belge*, xxviii. No. 4, p. 73; coloured plate).—This is a hybrid between *Lælia cinnabarina* fecundated by *Cattleya chocoensis alba*, a fine white variety having no trace of colour in the labellum. The flower of 'Prince Leopold' is of a beautiful yellow-orange, uniform throughout. The flowering lasts at least six weeks.—*G. H.*

Lamium with entire leaves. By G. S. Boulger (*Journ. Bot.* 485; pp. 150-154, 5 1903).—A critical and historical account of three forms of Dead-nettle formerly occurring as weeds in botanical gardens.—*G. S. B.*

Lathyrus pubescens. By Sir J. D. Hooker (*Bot. Mag.* tab. 7891).—Nat. ord. *Leguminosæ*, tribe *Vicieæ*. Native of temperate South America. This is a hairy, diffusely branching shrub. Leaves have one pair of leaflets, the petiole forming a branched tendril beyond them. Flowers with a standard of a pale violet-blue, and paler lilac wings.—*G. H.*

Layering (*Bull. Bot. Dep. Trinidad*, No. 38, p. 546, April 1903; with figure).—The description of a handy method of layering by means of a bamboo stem. The portion removed is cut with a dovetail to the inside of the hollow, so that when replaced no retaining string is required.—*E. A. B.*

Layering Aerial Branches. By Julien Charrot (*Rev. Hort.* March 16, 1903, p. 139).—To multiply plants which do not lend themselves easily to propagation otherwise, the writer first rings the branch just

below a strong bud, removing the bark for five or six millimetres during the growing season, a cicatrix then forming on the superior edge. In the autumn or spring following he arranges a non-perforated pan just below this point, which he fills with water: in this he places a well-drained pot with a little soil, the pot being slotted halfway down to admit the branch, which is then bent with the bud in the angle, the extremity brought upright and in the centre. The pot is then filled up and covered with chopped damp moss. The outer pan must be replenished with water and the resulting growth tipped. Another plan is to have two pots, both slotted, and filled with moss kept constantly damp. Recommended for woody subjects such as Oranges, Myrtle, *Mimosa*, *Camellia*, Laurel, Jasmin, *Magnolia*, *Ginkgo*, Kaki, *Liriodendron*, &c.—*C. T. D.*

Leaf Curl in Peaches. By G. S. Saunders (*Garden*, No. 1634, p. 183; 14/3/03).—Considering how often questions are asked as to the cause of the malady commonly known as 'leaf curl,' which so frequently attacks the foliage of Peaches and Nectarines, it is obvious that the real nature of the disease is not generally recognised. The disease is unquestionably caused by a fungus known as *Exoascus deformans*, and in spite of what some gardeners assert (that it is cold winds that are responsible for the complaint), it is certain that if this fungus did not exist there would be no leaf curl.

The welfare of this fungus, like that of all living organisms, is greatly dependent on its environment. When the weather in the spring is cold and wet, and particularly if a cold wind follows a spell of warm weather, the leaves become saturated with moisture, and are soft and flabby, their powers of transpiration are considerably lessened, and the general vitality of the tree is lowered. Under these conditions, which are very favourable to the growth of the fungus, the disease makes rapid strides, and the tree is soon in a pitiable condition; but if the weather be favourable to the growth of the young leaves, and consequently unfavourable to the fungus, the latter, though still present in the leaves, is unable to do them much injury.—*E. T. C.*

Lichens (Evernia), Chemistry and New Species of (*Beih. Bot. Cent.* xiv. ht. 1, p. 95; plates ii.–v.).—Professor Dr. Zopf has extracted many species of this genus with ether, and investigated the atranor-, physod-, and furfuracin-acids as well as other substances so found. He shows that forms not sharply distinguished morphologically can be separated by their chemical constituents. In other cases forms differing morphologically are chemically alike, though they may in other cases be quite different in chemical constitution. He shows that the quality of lichenic acids is independent of external factors (substratum or geographical position). On the strength of these chemical differences *E. furfuracea* is divided into five species, whose chemical constitution is fully given.—*G. F. S.-E.*

Lilies and their Culture. By Ch. Chevalier (*Rev. Hort. Belge*, xxviii.; No. 7, p. 153).—The author refers to numerous species of *Lilium*, with observations on their culture.—*G. H.*

Lilies, The Propagation of. By G. B. Mallett (*Garden*, No. 1635, p. 198, 21/3/03; No. 1638, p. 242, 11/4/03).—There is much in Lily propagation that would interest every gardener; and any chance seedling of merit that came into his hands would be saved to cultivation if he were able to perpetuate the form, whilst the renewal of stock, now an expensive annual necessity, would be reduced considerably if he were able to improve upon Nature's methods of bulb increase. There is no place better adapted for propagating Lilies than a well-tilled kitchen garden. The natural method of propagating is by means of seeds, but with the exception of *Lilium cordifolium*, *L. giganteum*, *L. tenuifolium*, and *L. polyphyllum*, and in the raising of hybridised seedlings and seeds of rare species, whose roots are not available, this method is not generally employed, being slow and uncertain. In common with those of all flowering monocotyledons, the seeds should be sown as soon as ripe or obtainable. Small lots of seeds should be sown in pans and introduced to greenhouse temperature if available; a whole season is thus gained, and seeds of low germinating power, such as invariably occur in hybridised capsules, are thus given a better chance of making headway.—*E. T. C.*

Linum, Polygonum, and Parkinsonia (*Beih. Bot. Cent.* xiii. ht. 3, p. 333).—Herr Prof. Dr. Friedrich Hildebrand describes the differences between *Linum austriacum* and *L. perenne*, the fleshy fruit, ochrea, and bud of *Polygonum perfoliatum*, and the various types of leaf and leaf-formation in *Parkinsonia aculeata*.—*G. F. S.-E.*

Liverworts (*Beih. Bot. Cent.* xiii. ht. 3, p. 265).—Herr Karl Müller (Freiburg im Breisgau) gives a list of localities of rare Hepatics from Alsace, Mulseburg, Erzgebirge, Tyrol, and Switzerland.—*G. F. S.-E.*

Lycaste × Balliæ (*Orch. Rev.* p. 80, fig. 19; March 1903).—Historical particulars are given with an illustration of the plant.—*H. J. C.*

Macrozamia Fraseri in the Garden of Ottonella. By Prof. G. Roster (*Bull. R. Soc. Tosc. Ort.* 1, p. 21, January 1903).—Seeds of this plant were sown in October 1900. The succeeding winter was exceptionally severe in Elba, where the garden is situated. In February 1901, on four successive days of which the minimum temperature was −0·2, +1·00, +0·8, −0·5, and on two consecutive days on which snow fell to the depth of 1 centimetres, the author examined the seeds in the ground and found that, of the eight sown, three had germinated and had almost pushed the tips of the first leaf above the ground. At the present time, a year after sowing, the three plantlets are extraordinarily vigorous, about 15 centimetres high, and each with three leaves of a fine deep green colour.—*W. C. W.*

Manures, Animal. By J. J. Willis (*Gard. Mag.* n. 2566, p. 12; 3/1/03). The contributions of this writer upon manures and kindred subjects deserve the special attention of gardeners, who as a rule do not trouble themselves so much about this matter as the importance of it demands. Mr. Willis in this article classifies the varieties of animal manures, and gives an analysis of each, with remarks upon the value of

the manure in relation to plant food. He remarks that the horticulturist who buys artificial manures but does not look carefully after the liquid manure from stables and cattle sheds, nor studies the best mode of application, is not practising economy, as he buys at great cost the chemical ingredients which he might have at a trifling outlay of time and labour. It is everywhere noticeable that, since artificial manures can be obtained with facility though at considerable expense, there is a tendency in gardens to neglect the natural manures because more laborious in application than the artificial manures.—*W. G.*

Maples, Chinese. By A. Henry (*Gard. Chron.* No. 837, p. 21, Jan. 10; No. 839, p. 62, Jan. 24; and No. 842, p. 100, Feb. 14, 1903).—In this paper is given an annotated list of 24 Chinese species of Maple, but the author says: "The above list by no means exhausts the Chinese Maples; other species occur in the north of China and in the coast provinces, and I had only an opportunity of seeing part of Mr. Wilson's dried specimens."

The list is divided into the following sections: "Simple-leaved species; species with tri-lobed, five-lobed, five to seven lobed, and trifoliate leaves." Many of these species are in cultivation in Messrs. Veitch's nursery at Coombe Wood, besides those Maples proper which all belong to the genus *Acer*. Two species are described under the genus *Dipteronia*, a very nearly allied genus.—*G. S. S.*

Mendel's Methods of Plant-breeding. By C. C. Hurst (*Gard. Chron.* No. 838, p. 33, Jan. 17, 1903; and No. 840 p. 76, Jan. 31, 1903).—This paper, which describes Mendel's methods of experimenting in hybridisation, was read before the International Conference on Plant-breeding and Hybridisation, New York City, September 30, 1902. It appears that the first hybrid plant raised by hand that has been recorded was a cross between a Carnation and a Sweet William, which was raised by T. Fairchild at the Hoxton Nurseries; since then numberless crosses have been made between different plants. As long ago as 1866 G. Mendel published at Brunn some remarkable experiments he had made in crossing distinct races of *Pisum*; his work, however, did not attract much attention in the scientific world until the year 1900, when it appeared in the Journal of the Royal Horticultural Society. Mr. Hurst says: "It seems to be too early yet to regard Mendel's principles as of general application to plants and animals. At the same time Mendel's experiments are a great advance on what has been done before, and will probably prove a stepping-stone towards the final solution of the problems of inheritance. For the present it may be wise to suspend our judgment and wait for further facts." An account is given of Mendel's methods.—*G. S. S.*

Mistletoe. Anon. (*Le Jard.* Feb. 20, 1903, p. 51).—It is observed that, although State edicts have been issued in France for the destruction of Mistletoe by landowners, no attempts are made to check its spread in the State forests, where it is doing much damage to the trees.—*C. W. D.*

Mole Cricket of Porto Rico. By O. W. Bennett (*U.S.A. Exp. Stn. Porto Rico, Bull.* 2, 9/1902; 1 fig.).—This insect (*Scapteriscus*

didactylus, Latr.), known locally as the "changa," is reported to do damage to the extent of 100,000 dollars annually in Porto Rico, injuring especially Cane, Tobacco, and Rice. It is a native of the hotter parts of America, feeds upon plant-roots, and is subterranean and nocturnal in its habits. Birds and lizards feed upon it; other enemies are not known. Clean cultivation, ploughing during winter and spring, trap lanterns when the changa is flying at night, arsenic or Paris green sprinkled on chopped grass and distributed in small patches just below the surface of the soil are the remedies suggested. The insect is described and illustrated.

F. J. C.

Mosses: Hypnum (Harpidium), Drepanocladus (*Beih. Bot. Cent.* xiii. ht. 4, p. 388; 2 plates).—Herr C. Warnstorf gives a thorough description, with analytical key, of the European species of this subdivision. The literature to date, the synonymy, the distribution and characters of some of the less well-known species are given. As regards these last the treatment is exceedingly thorough and illustrated by many figures of the leaves &c.—*G. F. S.-E.*

Mountain Gardens (*Le Jard.* May 5, 1903, p. 120).—Under the auspices of the authorities of the town of Lucerne two mountain gardens are now being established, one on the Rigi, the other on Pilatus, where mountain plants from all parts of the world are to be grown and tested.—*C. W. D.*

Muscari paradoxum. By Sir J. D. Hooker (*Bot. Mag.* tab. 7873).—Nat. ord. *Liliaceæ*, tribe *Scilleæ*. Native of Persia. Leaves are 12–18 ins. long. The scape is stout, with a dense spike of very dark violet-blue flowers with green margins.—*G. H.*

Musk Melons, Origin of American Varieties of. By F. W. Rane (*U.S.A. Agr. Exp. Stn. New Hampshire, Bull.* 96, p. 125; November 1902).—The writer gives letters received from many seedsmen in answer to his question regarding date of introduction, origin, parentage, &c., of many varieties.—*E. A. B.*

Mycorhiza. By Profs. L. Hiltner and C. v. Tubeuf (*Nat. Zeit. Land Forst.* i. pp. 9–25 and 67–82, 1 plate and 3 figs.; 1903).—The joint editors of this new periodical, the organ of the departments of Agriculture and Forestry in the University of Munich, have already done important work on mycorhiza. The two articles included here are reviews of recent work, and new observations by the authors.

I. Prof. Hiltner, associated with Prof. Nobbe, is well known by his investigations on the root-tubercles of *Leguminosæ*. Of less economic importance, but no less interesting, are his researches on root-tubercles of Alder, *Elæagnus*, and *Podocarpus*. Hiltner's review deals chiefly with a recent paper on root-tubercles of trees by Prof. Shibata (Japan); leaving the discussion aside, we give the chief results. The large swellings on the roots of the Alder originate from action of a bacterial organism which may be isolated and successfully used to infect Alder seedlings. Infection takes place through the root-hairs (as in *Leguminosæ*), and these

become distorted and twisted as shown by Hiltner's figures. The root-hairs die off on infected parts of the root, but remain on other parts. The bacteria lie embedded in mucilaginous filaments, which have led other observers to believe that the organism was a filamentous fungus. The organism in Alder tubercles is nearly allied to that in *Leguminosæ*, and its action is otherwise very similar. The author's views on the relationship of the organism and its host-plant in the Alder and *Leguminosæ* are important. It is now generally accepted that the host-plant aided by the root-tubercles can acquire nitrogen which is not available if the tubercles are absent. Frank and others state that this results from the absorption of the bacteroid bodies of the tubercle-organism by the host-plant. Hiltner states that this is only the case when the organism is starved. The normal and more frequent case (as proved by Nobbe and Hiltner's researches) is that the host-plant, with the aid of ferments, absorbs only portions of the bacteroids, and that the supply of nitrogen can only continue if the organism can find ways and means to replace absorption by the host. On the one hand, the tubercle-organism utilises carbohydrates obtained from the host-plant; on the other hand, nitrogen obtained from the atmosphere. The bacteroids are regarded by Hiltner as rudimentary sporangia, which give rise to chains of rod-like bacteria; the sporangia are evidence of a struggle on the part of the organism to maintain itself. When the tubercle-organism is virulent, infection of *Leguminosæ* or Alder results in the formation of tubercles which do not contain bacteroids; the host-plant is not benefited, and may even be injured if grown under conditions where nitrates are not obtainable from the soil.

The mycorhiza of *Podocarpus* consist of a filamentous fungus which lives (as the figure shows) in the cortex of the roots. It is endotrophic, like that of *Neottia* and other Orchids, and the mycorhiza are distinct from the tubercle-growths or mycodomatia of *Leguminosæ*, Alder, *Elæagnus*, and *Myricaceæ*. The relation of host to fungus is that the former partially absorbs the latter. The fungus obtains carbohydrates from the host and nitrogen from the atmosphere.

II. Prof. Tubeuf, about ten years ago, vigorously opposed the view of Frank that forest trees obtained all their nutritive elements from the soil through the activity of the ectotrophic mycorhiza (*i.e.* modified roots covered externally with fungus filaments). Tubeuf in this paper restates his argument that forest trees have normal roots with root-hairs, which are capable of supplying the plant with water and soil-salts; mycorhiza may, however, be developed under certain conditions. Stahl recently advanced a theory that the presence of mycorhiza on plants facilitated the procuring of water and soil-salts. This may be the case in plants with a small leaf-surface (*e.g.* Heaths and Pines), or with leaves which do not give off water easily (*e.g.* Oak); or it may occur in cases where water and salts are difficult to obtain, either because the soil lacks them (as in sand), or because of excessive competition by soil-fungi (as in peat, and forest soils with much humus). Tubeuf, while admitting the general truth of this theory, does not agree with all the details. Endotrophic mycorhiza have only a limited communication with the surrounding soil, and cannot, therefore, furnish water or salts to any great extent; their

chief function (see Hiltner, on p. 272) is to fix atmospheric nitrogen. Ectotrophic mycorhiza provide the host-plants with nitrates, which the fungus obtains by breaking up nitrogenous compounds contained in humus. The mycorhiza occur in forest humus and peaty soils very deficient in nitrates, but rich in combined nitrogen. The fungus finds in the tree-roots a convenient supply of carbohydrates, and Tubeuf believes that the initiative is taken by the fungus seeking these in the roots; the tree benefits by the nitrogen supplied by the fungus, and so a symbiosis is set up. The effect of the symbiosis is that the widely spreading normal roots with root-hairs become reduced to the short knotted tufts of mycorhiza; transitions from one form of root to the other are figured. Mycorhiza occur in peat or forest humus, in almost pure sand, and in manured farm-soils. Root-hairs are best developed in dry sands or loams, and in peat which is well drained; they are less abundant in wet soils. Trees grow best where they have deep roots with root-hairs, and trees artificially manured outstrip those dependent on mycorhiza for their supplies. There is as yet no evidence of a specific mycorhiza-fungus; it seems that many fungi can associate themselves with roots to form mycorhiza. Tubeuf also has an interesting discussion on the nutrition of Mistletoe.—*W. G. S.*

Nematodes in Garden Plants. By Osterwalder (*Zeit. f. Planz.* xii. pp. 338–342, 5 figs. 1903).—Eel-worms have frequently been found in indoor plants, but the author directs attention to their frequent occurrence out-of-doors. The course of the attack is described and figured in *Phlox decussata*, *Cystopteris fragilis*, *Chelone glabra*, *Anemone japonica*, and *A. sylvestris*. The nematode in almost every case was *Aphelenchus olesistus*. The author's experience is that plants attacked need not be sickly, but that contact of healthy plants with leaves infested with eel-worms, or the presence in quantity of the latter in the soil, is sufficient.

W. G. S.

Nicotiana Hybrids. By Georges Bellair (*Rev. Hort.* Feb. 1, 1903; pp. 54–55; four illustrations).—Interesting description of the results in the second generation of crossing *N. sylvestris* and *N. Tabacum*, white flowers and pink flowers being obtained, with great diversity of form and size. Offspring of first cross were identical, a few seeds being produced: these were sown with above result, neither the original parental types nor that of the first cross reappearing, while all differed more or less from each other, justifying Naudin's definition of a hybrid as 'a mosaic.'

C. T. D.

Nitsche, Prof. H.: Obituary Notice. By O. Nutzlin (*Nat. Zeit. Land-Forst*, i. pp. 49–59; photograph; 1903).—This well-known Professor of Forest Zoology died on November 8, 1902. His best-known work is "The Forest Insects of Central Europe." A long list of papers shows how active he was. The biography is well worthy of the attention of entomologists.—*W. G. S.*

Nucleus (*Beih. Bot. Cent.* xiv. ht. 1, p. 13).—Professor V. Grégoire and Dr. A. Wygaerts give a preliminary note as to their observations on the nucleus of roots of *Trillium*. The chromatic filaments do not seem

to be at any stage united into a "ligne maîtresse" or "peloton," but to preserve their autonomy not only at the beginning of the resting period but throughout this stage, so that the chromatic filaments of the prophase are those of the preceding telophase. The anastomoses, the alveolisation, and the longitudinal division of the filaments are described. Many other details are given as to prophase and telophase.—*G. F. S.-E.*

Oak Galls, and Gall Insects of Epping Forest. By E. J. Lewis, F.L.S. (*Essex Naturalist*, Dec. 1902, p. 267; with cuts).—This paper may be accepted as an introduction to the study of Galls and their makers, treating the subject under the following headings: Cause of the formation of Oak Galls; Parthenogenesis and alternation of generations; Gall variation; Inquilines and parasites; Protection against parasites; Oviposition and growth of the Gall; The general characteristics of the family *Cynipidæ*; Genera of the sub-family *Cynipinæ* which occur as Inquilines in Oak Galls; Collecting Galls; Experimental breeding; Preservation of Galls; Classification. These are followed by an intimation that the subject is to be continued, and it is one on which popular information, conveyed in a free and easy manner, is desirable.

M. C. C.

Oak, Historic, destroyed (*Journ. Hort.* March 19, 1903, p. 24).—The gales of February have destroyed an historic, or rather a legendary, Oak tree near Watton in Norfolk. It was situated in Wailing Wood—a name said to be corrupted from Wayland Wood—and tradition said it was the tree under which the two villains in the famous ballad of "The Babes in the Wood" fought their battle.—*C. W. D.*

Oak-leaves, Ecological Study of. By W. Breuner, *Klima und Blatt bei der Gattung Quercus* (Rev. in *Bot. Gaz.* xxxv. No. 2, p. 141, by E. B. Copeland).—Breuner's study was upon the Oak-leaves of the world, as to their general adaptations to their native climates. The results of experiments and of local differences in environment correspond to the specific characters in the climates imitated; whence Breuner concludes that "the modifications in plants called forth by external causes become hereditable, and in the course of evolution may develop into specific characters."—*G. H.*

Oaks, Sessile and Pedunculate. By W. R. Fisher (*Gard. Chron.* No. 845, p. 156, figs. 62, 63, 64, 65; March 7, 1903).—This paper appears to be a sequel to one published in the *Gardeners' Chronicle* of September 22, 1900, by the author. He shows that the "sessile" Oak grows best on comparatively dry soils, while the pedunculate variety decidedly prefers a moister one, "while on hillsides with sufficient clay in the soil, and an abundant rainfall, the two Oaks grow amicably side by side, as we see in the Ardennes and on the Sussex downs." Three figures are given of trees growing at Chatsworth, at an altitude of from 750 feet to 900 feet, on the millstone grit, which "gives a dry, well-drained soil, only rendered moderately moist by the heavy rainfall of the Peak district." The three photographs show plainly that the pedunculate trees have passed their prime, and are becoming "stag-horny," while the sessile Oaks appear in full vigour.—*G. S. S.*

Oat Smut in Wisconsin. By R. A. Moore (*U.S.A. Exp. Stn. Wisconsin, Bull.* n. 98; 1903).—From reports and investigations in this State it is estimated that the loss from Oat smut in 1902 was not less than 17 per cent. of the crop; that the value of this loss was not less than five million dollars; that practically all this loss can be saved by the formaldehyde treatment, if the directions are carefully followed; that no fewer than 10,000 farmers successfully treated seed Oats to prevent smut in the past season; that the strength of solution advisable in which to submerge Oats is made by pouring one pint of 40 per cent. formaldehyde into 36 gallons of water. Seed Oats enclosed in gunny sacks to be submerged for ten minutes and then exposed to dry.

M. C. C.

Ochnaceæ, The. By Ph. van Tieghem (*Ann. Sc. Nat.* (*Bot.*) xvi. pp. 161-416; 1902).—An important monograph on this order of tropical plants. The size of the order has been increased from about 150 species to 53 genera, including 473 species, of which 260 are new. The new species include many discovered within the last ten years. There has also been a certain amount of transference of genera and species formerly placed in other groups. The arrangement of the matter makes the paper easy of reference, although it is very detailed. The first part gives the general anatomical features of the group: structure of stem, leaf, root, inflorescence, flower, fruit, and seed. The divisions of the order are described, and the grouping of the genera is given as a table (p. 201). The greater part of the paper is occupied by a detailed account of the genera and species. In this part, besides the purely descriptive matter, there are notes on the discovery of many of the species and on the synonymous names. The work is indispensable to those having occasion to work amongst the *Ochnaceæ*.—*W. G. S.*

Odontoglossum crispum, Varieties (*Orch. Rev.* p. 93; March 1903).—*Odontoglossum crispum* 'Mrs F. Peeters,' *O. c.* 'Marie,' *O. c.* 'Marie Corelli,' are described, and pointed remarks are made with respect to the distinction in the numerous varieties of *O. crispum*.—*H. J. C.*

Odontoglossum × lepidum. By R. A. Rolfe (*Orch. Rev.* p. 35; Feb. 1903).—Interesting particulars of this natural hybrid and its synonyms are given.—*H. J. C.*

Odontoglossum × waltonense (*Orch. Rev.* p. 49, fig. 14; Feb. 1903).—A photographic illustration of this hybrid, derived from the intercrossing of *O. crispum* and *O. Kegeljani* (*polyxanthum*), and interesting particulars are given.—*H. J. C.*

Olearias. By S. W. Fitzherbert (*Garden*, No. 1642, p. 313; 9/5/03). Though *O. Gunniana* is not so hardy as its New Zealand relative *O. Haastii*, it is not exceptionally tender, and good bushes of it may be seen in Herefordshire. *O. stellulata* was for some years considered a distinct species, but is now only recognised as a variety of *O. Gunniana*. Many nurserymen still catalogue them as distinct, and that sold as *O. stellulata* appears to have larger flowers, the petals of which are a trifle more

separated than in the case of *O. Gunniana*. The foliage of the two, however, is identical. This species flowers considerably earlier than *O. Haastii*, and is generally at its best in the south-west in May.

It succeeds best in a sunny position, and is not particular as regards soil. Large specimens, 6 feet or so in height, make charming pictures when white with countless blossoms; and although *O. Gunniana* cannot excel *O. Haastii* in the number of its flowers, it has a far more graceful habit, which renders it more ornamental as a garden shrub.—*E. T. C.*

Onion Fly, The. By J. Bracken (*Gard. Mag.* n. 2574, p. 139; 28/2/03).—This insect pest is described and illustrated in a clear way, together with details of its life-history and the best means of treating a crop attacked by it, and the measures to be taken to prevent its appearance. The Onion Fly named *Phorbia cepetorum* in one place is meant, no doubt, to be the *Anthomya ceparum* in another part of the article.—*W. G.*

Orchard Conditions. By Prof. Alwood (*U.S.A. Hort. Soc. Virginia, Report* 1902, pp. 86–109).—An Apple tree with well-formed abundant head is at 12 years old capable of bearing 10 to 15 bushels of fruit. Thirty-inch stem recommended (*i.e.* from surface of ground to commencement of branching).

Details as to growth and crop of Apples from trees of different varieties 12 years old.

Estimated annual cost per tree, 50 trees to the acre, 1*s.* 3*d.* per tree (10*d.* manual labour, 5*d.* horse and wear and tear of tools).—*C. H. H.*

Orchards, Grass. By G. H. Hollingworth (*Gard. Mag.* n. 2576, p. 176; 14/3/03).—The writer argues in favour of grass under orchards, instead of keeping the soil open and cropping it.

From a picturesque and sentimental standpoint, without doubt there is much to be said in favour of grass orchards; but from a profitable point of view, whether in the production of the finest fruit or the utilisation of land, the system may be open to question.

It is purely a question of circumstances whether the beauty of a grass orchard can be enjoyed, or whether for some years at least the land should be cropped.

A grass orchard does not entirely do away with the labour of maintenance, as the grass must either be cut or fed off occasionally.—*W. G.*

Orchard Studies (*U.S.A. Exp. Stn. Virginia, Bull.* n. 130, November 1901; 12 figs.).—A "catalogue raisonné" of several varieties of Apple grown at the Experiment Orchard of the Blacksburg Agricultural Station in Montgomery County. The trees were purposely tested under conditions of culture easily available to the average grower, and the soil and climate of the station are below the average in adaptability to Apple-growing, so that it would be quite reasonable to expect the results here set forth to be surpassed under private management in more favoured districts.

The bulletin incidentally restates the maxim that the commercial orchard must be kept clear of experiments, but adds that both for pleasure

and profit it will always be to the interest of owners of private orchards to make a point of testing new varieties in a small way.

In the meantime the following are recommended under different headings :—

Among summer ripeners :

'Early Ripe,' 'Yellow Transparent,' and 'Oldenburg' thrive under all conditions, and 'Chenango' and 'Summer Rose' are fine varieties for the amateur grower.

For autumn :

'Maiden Blush,' 'Buckingham,' and 'Wagener,' are what the bulletin calls "cosmopolitan" varieties, and 'Bonum,' 'Fall Orange,' and 'Tolman' have "commercial value."

For winter :

'Arkansas,' 'Gano' or 'Via,' and 'York Imperial' are good cosmopolitan varieties, and where the soil and climate are suitable select 'Albemarle,' 'Pippin,' 'Winesop,' and possibly 'Lawyer.'—*M. L. H.*

Orchard Report. By Geo. A. Koyner (*U.S.A. Hort. Soc. Virginia, Report* 1902, p. 240).—A six-and-a-quarter-acre Apple orchard, trees three years old when planted, yielded the seventh year 200 barrels of select Apples, the ninth year 325 barrels, the eleventh year 460 barrels, the thirteenth 575, the fifteenth 768 barrels. A barrel contains about $2\frac{1}{4}$ bushels.—*C. H. H.*

Orchids and Sphagnum (*Rev. Hort. Belge,* xxviii. No. 5, p. 101). M. Arnould Wincoz, in a paper on 'The Nutrition of Orchids,' describes the virtues of sphagnum and peat as retaining in their pores the necessary gases for epiphytal Orchids. Protection must be provided against insects in the sphagnum, as their excrement and dead bodies supply the principal check to a successful cultivation of epiphytal Orchids. He describes the insecticides and method of usage.—*G. H.*

Orchids, African (*Not. König. Bot. Berlin,* iii. p. 237, March 1903).—Kränzlin describes the two new Orchids, *Habenaria myriantha* (Kränzlin), from German East Africa, and *Polystachya appendiculata* (Kränzlin), from Cameroons.—*M. W.*

Orchids: Benefit of Association with other Plants. By G. T. Grignan (*Rev. Hort.* May 1, 1903, pp. 198–9).—In connection with the theory that bacteria play an important part in Orchid nutrition, a case is cited where a wild hardy Orchis, *Orchis latifolia*, being planted by the side of weakly exotic Orchids, vigorous growth resulted in the latter, but only temporarily, as the *O. latifolia* could not stand exotic conditions. An interesting case is, however, cited of a *Spiranthes autumnalis* seedling appearing on a tuft of *Iris florentina* which had been thrown away; and since this Orchid is specially difficult to grow, the hint was taken, *Iris florentina* was substituted, being smaller, as associated plant, and thenceforth *Spiranthes* flourished even better than in a wild state. Other rebellious species also yielded in like manner.—*C. T. D.*

Orchids, Hybridisation of. By G. T. Grignan (*Rev. Hort.* Feb. 16, 1903, pp. 81–83).—A description of a number of recent successes in France and England.—*C. T. D.*

Orchids in the United States. By Crassinode (*Orch. Rev.* p. 104; April 1903).—Some interesting particulars as to the growth and sale of Orchids in a prominent trade establishment are recorded.—*H. J. C.*

Orchids, Raising Seedling. By H. J. Chapman (*Gard. Mag.* n. 2568, p. 41; 17/1/03).—A particularly lucid article on a subject which, while of limited application among gardeners generally, is interesting and instructive as showing the great amount of detail necessary to observe in raising seedling Orchids.

Beyond everything, seedling Orchid raising demands the exercise of that rare virtue patience, as years in most cases elapse between the sowing of the seed and the flowering of the seedlings. The writer, who is a well-known orchidist, records what must be considered a remarkable instance of the short interval of time between seed-sowing and flowering. He states that a *Calanthe* fertilised in December 1901 ripened its seeds, which germinated a few days after they were sown, on March 24, 1902. In December of the same year the seedling produced a flower-spike, and the photograph of the plant in flower is reproduced to illustrate this article.

This is surely a "record" of an Orchid seedling producing flowers within a year of sowing seed. On the other hand, we know that several years have elapsed between seed-sowing and flowering in the case of Cattleyas and Lælias. The article is excellent reading, and illustrated in an instructive way.—*W. G.*

Oxalis crenata. By A. Worsley (*Gard. Chron.* No. 846, p. 171, fig. 72; March 14, 1903).—The author says: "This excellent vegetable is but little known in European gardens, although it has been introduced for many years; this is due to a little technical difficulty in its proper cultivation, which can easily be overcome." This plant is grown for the sake of the tubers, which are formed on the roots as soon as the growth of the foliage is arrested towards autumn; then, if early frosts occur and kill the leaves before the tubers are properly formed, the crop is lost. The difficulty, therefore, is to keep the leaves alive during October and November. This, however, may be managed with the help of a little protection in the way of litter, bracken, &c. This plant is a native of Peru and Bolivia. Generally the plant is of the same hardiness as the garden Potato, but the 'Oka' (the Peruvian name) has this advantage, that it can grow through severe drought and is not subject to disease; it will never be a rival to the Potato; the tubers are not large enough, being only $1\frac{1}{2}$ to 2 inches in length, yet it has many advantages in its unique and delicious flavour, in its long keeping capacity, and in the fact that it requires no preparation whatever before cooking.—*G. S. S.*

Oyster-shell Bark Louse. By Prof. W. T. Macoun (*Proc. Am. Pom. Soc.* 1901, p. 14).—After two years' experimenting at Ottawa, lime spraying in the autumn is recommended. As soon as the leaves fall, spray

2 lb. of lime to 1 or 2 gallons of water, fresh slacked lime, strained and applied to the tree, covering the tree from top to bottom with this mixture in two applications, the second being put on as soon as the first is dry; it also destroys large numbers of insect eggs.—*C. H. H.*

Pæonies, Tree. By W. T. (*Gard. Mag.* n. 2586, p. 339; 23/5/03).—The early history of these beautiful shrubs since their introduction into Europe is given, and very interesting incidents are related. The writer throws out the suggestion that the old Moutan Pæony may be hybridised with the new yellow-flowered *Pæonia lutea*, and originate a new race of Tree Pæonies with a greater range of flower colour. This is probable.

W. G.

Palms: Hardy Forms. By G. Ugolini (*Bull. R. Soc. Tosc. Ort.* 3, 4, p. 91; March–April 1903).—*Chamærops humilis*, called by the Italians the Palm of San Pier Martire, by the French 'Petit Palmier,' and by the English 'Dwarf Palm,' occurs wild along the Mediterranean coast, where it forms large impenetrable bushes, five to six metres high. It is multiplied by offshoots and by seeds, which are abundantly produced. It is cultivated with success in the north of Italy, where it is able to resist the cold, its leaves preserving a glaucous green colour even through the winter. It flowers in May, with gigantic bunches of monœcious, yellowish flowers, succeeded by the fruits, which are worthless save for reproducing the species. *C. excelsa*, Thunb., a native of China, is even more hardy and resistent to winter's cold than the last species. But its habit is less elegant, and its foliage apt to get injured by frost and wind. Its single stem rises to a height of 10 metres. It is only ornamental during youth when the stem is still clothed throughout with leaves of a flabelliform shape and fine green colour. It also flowers in May, and is easily propagated by means of its abundant fruits.—*W. C. W.*

Parthenogenesis in Ficus hirta. By M. Treub (*Ann. Jard. Bot. Buit.* Ser. II. vol. iii. 1902; pp. 124–154; 10 plates).—The author gives strong evidence in favour of the view that in certain species of Figs the embryo can develop from the egg-cell without the fertilisation of the latter by a male cell from the pollen-tube. He observed the germination of the pollen grains on the stigma of *Ficus hirta*; but he failed to observe the pollen-tube even reaching the ovule in any of the very numerous ovules investigated, though these already showed the earlier steps towards the change into seeds, including the development of an embryo and the initial stages of the formation of a multicellular endosperm.—*F. G.*

Passiflora laurifolia, Fruit of (*Bull. Bot. Dep. Trinidad*, No. 37, p. 511; January 1903).—Known as the 'Belle Apple,' this is praised as an excellent fruit, but care should be taken not to eat any of the rind, as it possesses strong emetic properties. It is sold in the markets of the Windward Isles. *E. A. B.*

Pears: Varieties induced by Secondary Grafting. By Pierre Passy (*Le Jard. Illust.* March 1, 1903, pp. 105–8; 6 woodcuts).—An interesting

article on variations in form of Pears within the same variety, and a list of new varieties obtained by secondary grafting, *i.e.* one variety grafted upon another, already grafted on a common stock, the second graft being affected by the first, forming a graft cross. The writer, however, doubts the value of these varieties in view of the facts he cites and illustrates of great variations in form independently of such a cause. Some further remarks in this connection are contributed by Charles Baltet (*Rev. Hort.* March 16, 1903, p. 122) leading to the assumption that grafting on a vigorous previous graft tends decidedly to improve the fruit, at any rate in size.—*C. T. D.*

Peas, Sweet (*Garden*, No. 1633, p. 156; 7/3/03).—In growing Sweet Peas the great secret consists in the selection of varieties, deep tillage of the soil, keeping the seed-pods picked off, and affording the roots copious supplies of moisture during dry weather.

A border should, if possible, be devoted entirely to them, and each variety grown by itself. The old-fashioned way of growing them in a mixed hedge has little to recommend it, but by isolating the various colours one is able easily to determine the best and most distinct varieties, and the seed of each can be saved and kept separate.—*E. T. C.*

Pear Trees in Pots. By Fréd. Burvenich père (*Rev. Hort. Belge*, xxviii. No. 2, p. 32; with fig. in text).—The article deals with the culture of Pears in pots.—*G. H.*

Pecan, Budding the. By George W. Oliver (*U.S.A. Dep. Agr. Bur. Pl. Ind., Bull.* No. 30, 9/12/1902; illustrated).—Like most other domesticated fruit-trees, the Pecan nut does not always come true from seed, and therefore requires to be budded when a known variety is to be propagated.

This operation has hitherto been difficult and uncertain, owing partly to the wrong buds being chosen and partly to an improper method being used. Transplanting is also attended with some difficulty and risk unless certain precautions are taken.

The best buds are those from the base of shoots a year old, the current season's growth being too soft and immature, and bruising readily.

"Patch" budding is recommended, and the bud should be started into growth as soon as possible after union has taken place in order that it should make a good shoot before winter.

Transplanting is not advised till the end of the third year, when the bud will have made substantial growth, and a portion of the long tap-root may be sacrificed without too much risk to the plant. Every care should be taken to prevent drying of the roots, and with these precautions it is claimed that unsuccessful results will be few.—*C. H. C.*

Permeability of the Cell-wall to Air in the Sporanges of Ferns and Selaginella, and in Moss-leaves. By F. Steinbrinck (*Flora*, vol. xcii. 1903, pp. 102–131; pl. v.).—The author has succeeded in proving that even the dry cell-walls of the annulus of the Fern-sporange, of the valves of the Selaginella-sporange, and of the leaf of *Mnium* are permeable to air, the small amount present after desiccation being due

to the collapse of the cell-walls. If the entire leaf of *Mnium* as a whole makes an efficient closure to a Torricellian vacuum, it must be due to the fact that *either* the upper *or* the under tangential cell-walls are impermeable, and so form an impervious membrane.—*M. H.*

Petroleum : its Use as an insecticide. By R. Gérard (*Le Jard.* March 20, 1903, p. 90).—A new formula for the preparation of this is given, said to surpass all others in efficiency. Its merit is due to the addition of saponine, an extract of the root of *Saponaria officinalis*, in the proportion of one part by weight of saponine to thirty parts of petroleum.—*C. D. W.*

Phaius, A Group of (*Orch. Rev.* p. 136, figs. 27 and 28; May 1903).—Illustrations of the so-called *Phaius* (*tuberculosus*) section of hybrids, with their parents, are given; also *P.* × 'Clive.' Particulars and descriptions of the species and hybrids are also included.—*H. J. C.*

Phalænopsis Kunstleri. By Sir J. D. Hooker (*Bot. Mag.* tab. 7885).—Nat. ord. *Orchideæ*, tribe *Vandeæ*. Native of the Malayan Peninsula. This species has few leaves, and terminal, seven-flowered racemes. The perianth is nearly 2 ins. broad. Sepals and petals equal and similar; red-brown in the middle, but with golden tips and bases.
G. H.

Philadelphus Delavayi (Henry). By L. Henry (*Rev. Hort.* Jan. 1, 1903, pp. 12–14; one woodcut).—Differs markedly from *P. coronarius* (of which the Kew Index notes it as a variety) in numerous characters, and is quite hardy, while *P. coronarius* is not. Henry considers it a different species, and hence names it as above.—*C. T. D.*

Picea neoveitchii. By M. T. Masters (*Gard. Chron.* No. 843, p. 116, figs. 50, 51; Feb. 21, 1903).—A new species of *Picea*, discovered by Mr. E. H. Wilson in Western Hupeh at an altitude of about 5,500 feet. Only one tree was found, which was about 30 feet high, and grew on the top of an almost inaccessible cliff: it appears to be quite a distinct species. Figures of the foliage and a cone are given, and a Latin description of the tree.—*G. S. S.*

Pineapple Culture in Queensland. By Albert H. Benson (*Qu. Agr. Journ.* xii. March 1903).—Suggestions and instructions are given, in two consecutive communications, for the cultivation of the Pineapple in Queensland, where there is an accepted Pineapple belt of 1,100 miles suitable for the purpose. The paper deals with the selection of site, preparation of the land, planting, and general culture.—*M. C. C.*

Platycerium (*Gard. Chron.* No. 837, p. 24, figs. 10, 11, 12, 13, and supplement; Jan. 10, 1903).—The members of this well-known genus of Ferns are widely distributed in the tropics of West Africa, the Malay Archipelago, and North Australia. They grow naturally on the boughs of trees, producing two kinds of foliage, "the one sterile, flat, and comparatively little lobed, reminding one of a huge prothallus; the other deeply lobed, with dense masses of brown spore-cases on the under

surface." The figures show the style of growth and methods of reproduction of these plants very well.—*G. S. S.*

Platycerium of the Congo. By Émile Laurent (*Rev. Hort. Belge*, xxviii. No. 4, p. 85, and photo).—This describes two species, *P. Stemmaria*, Dev., or *P. æthiopicum*, Hook., and *P. angolense*, Welw.
G. H.

Podalyriæ, Seeds of (*Beih. Bot. Cent.* xiv. ht. 1, p. 20; plate).—Herr Lindinger gives a very interesting and valuable account of the structure and biology of the seed in this group. He shows that the "strophiola" of Bentham and Hooker includes both a caruncle proper and also a ring-like bulging of the testa as in *Baptisia* and *Piptanthus*. The seed consists of the following layers: On the outside (1) cuticular layers (not always present); (2) a palisade layer of closely packed, thickened, and usually empty cells; (3) "hourglass" cells in one or two layers; (4) the mucilaginous endosperm ("schleimendosperm"); and (5) embryo.

By germinating seeds deprived of the endosperm and testa, he showed that the mucilage does not appreciably assist in nourishing the embryo. He then points out that its thickness varies with the thickness of the palisade layer, and that both are especially well developed in the West Australian seeds (dry hot climate). He then shows that its proper function is to break open the hard and massive testa by absorbing water at the same time protecting the embryo. About 63 species belonging to 22 genera are described in detail, and the germination was studied in the case of 35 species.—*G. F. S.-E.*

Polemonium confertum. By E. Wocke (*Die Gart.* p. 356, April 25, 1903).—An illustrated article on this lovely North American High Alpine. Raised from seed, it flowers the following year; planted in a dry exposed position on the rockery, it remains dwarf. The flowers are of a deep blue. The form *pulcherrimum* hardly differs from it, but *P. confertum* var. *melitum*, a coarser plant with creamy-white flowers, looks almost like a distinct species.—*G. R.*

Pollen, Action of, under Stimulus of Alien Stigmas (*Rev. Hort.* March 1, 1903, pp. 99, 100).—M. Pierre-Paul Richer reports result of investigations in this direction to the Académie des Sciences. The emission of the pollen-tube is stimulated normally by the secretions of the stigma, but in some cases the pollen will germinate in pure water or water slightly sweetened. M. Molesch had already ascertained that the pollen of some species which would not germinate in pure water does so if a stigma of the same species be placed in the water. M. Richer therefore conceived the idea of inducing germination by placing in the water stigmas of other species or even genera, and found that *Scilla nutans* pollen germinated equally readily in the presence of stigmas of *S. campanulata* as with its own stigmas. *Rhododendron ponticum* responded to *Kalmia angustifolia* and *Erica cinerea*. *Verbascum Thapsus*, *V. floccosum*, and *V. Lychnitis* responded to each other fully, and *Linaria vulgaris* to *Antirrhinum majus*. *Verbascum Thapsus* responded in a

mediocre manner to *Linaria spuria; Rhinanthus Crista-galli, Viola tricolor, Calystegia sepium* still less or not at all to the stimulus of the stigmas of *Sinapis arvensis, Lychnis dioica, Solanum nigrum, Campanula Rapunculus, Odontites rubra*, &c. The fact that germination is difficult or impossible in the presence of plants of different families explains the difficulties of hybridisation. M. Richer has, however, remarked some very interesting instances where germination results in such cases, as *Rhododendron ponticum* under the influence of *Tradescantia virginica, Linaria vulgaris* under that of *Œnothera biennis*, &c., and proposes to continue his experiments with a view to ascertaining other causes which, under natural conditions, may hinder the protrusion of the pollen-tubes on alien stigmas.—*C. T. D.*

Pollination in Orchards. By Professor F. A. Waugh (*U.S.A. Hort. Soc. Minnesota, Rep.* 1902).—The author's work has been chiefly with Plums, and he found that a very large majority of varieties were self-sterile. Experiments on cross pollinating show that the pollen of one variety will fertilise almost any other variety providing that they blossom at the same time.—*F. J. C.*

Potato Moth. By Walter W. Froggart, F.L.S. (*Agr. Gaz. N.S.W.* pp. 321-326; April 1903).—Among the many pests that attack the Potato this is certainly one of the most widespread; for though there are others, such as the Colorado beetle, that in its native land does more extensive damage locally, yet this little brown moth, from its habits, can be so easily transported from place to place in seed Potatos, old bags, and packing that it is only a question of time when it will have probably followed the Potato all over the world. At present it is unknown in England and the greater part of Europe, and is only a slight pest in a section of the United States. Meyrick suggests that it would not become a pest in any temperate climate where cold wet winters were the rule; but as it is so well known in New Zealand and Tasmania this does not seem to hold good as regards climate. Though this Potato pest was recorded from Tasmania as far back as 1854 by Captain Berthon, it was not described or given a name until Boisduval bred a specimen from Potatos grown in Algeria in 1874. Quotations are made from articles written by Meyrick (1880), Tepper (1882), Tyron (1889), Olliff (1892), French (1893), and Kirk (1894). There are two well-defined infestations by the Potato moth: the first from the winter brood, coming forth when the tops are growing and ruining the crops by killing the foliage, and the second when the moths from this brood lay their eggs upon the Potatos themselves, either in the field or after they are stored. A general account of the life-history of this pest follows, together with suggestions for remedies.—*H. G. C.*

Potato Scab, Prevention of. By R. A. Moore (*U.S.A. Exp. Stn. Wisconsin, Bull.* n. 98, 1903).—The disease known in the United States as 'Potato scab' may be prevented by submerging the uncut seed Potatos in the formaldehyde solution, which should be made by pouring one pint of formaldehyde into twenty-five gallons of water, and the Potatos submerged for two hours. The percentage of scabbed Potatos was in this

way reduced from 19 per cent. in the untreated to 5 per cent. in those treated.—*M. C. C.*

Potatos, Experiments with. By J. F. Williamson (*Gard. Mag.* n. 2567, p. 23; 10/1/03).—A short but most interesting and valuable account of the results of an experiment upon a Potato crop, consisting of ten selected varieties. All were planted, it appears, under precisely identical conditions, and the tubers were lifted on the same date, October 8. In each case seven pounds of tubers were planted, the highest yield was from 'Champion II.,' with a gross weight of 210 lb., with 1 lb. diseased and 195 lb. marketable; while the lowest yield was from 'New Century,' with 91 lb. gross weight, 2 lb. diseased, and 79 lb. marketable.

The manure applied was 1 cwt. of muriate of potash, 1 cwt. of sulphate of ammonia, and 6 cwt. of basic slag per acre over a fair dressing of farmyard manure. Such an experiment is of serious value, and affords an object lesson of how experimental work, to be of value and interest, should be conducted by public bodies.—*W. G.*

Potatos, Field Experiments with. By G. L. Sutton (*Agr. Gaz. N.S.W.* pp. 348–354; April 1903).—Particulars of experiments carried out at the Hawkesbury Agricultural College and Experimental Farm. The following trials were carried out:—

(1) Trials of planting at different depths.
(2) Fertiliser trials.
(3) Test of varieties.

(1) Shallow planting *v.* deep planting. Two depths for planting were compared, viz. four inches, or shallow planting, and six inches, or deep planting. These depths were chosen because four inches is the customary depth to plant Potatos in the district, and six inches was found to be as deep as it was possible to plant with the ordinary farm implements. The outcome of the experiment showed that better results are obtained when the Potatos are planted six inches deep than when planted four inches deep.

(2) Fertiliser trials. The experiment was divided into three sections as follows:—

(*a*) Trial to show the effect of omitting one or more ingredients of plant-food from a complete fertiliser.
(*b*) A trial of two nitrogenous fertilisers alone and in combination with each other.
(*c*) A trial to compare the value of phosphoric acid from different sources, when used alone and in combination with superphosphate.

Full details of these trials are given. The results cannot but be regarded as disappointing, as they are not definite and in some cases are contradictory, rendering it impossible for reliable conclusions to be obtained from them.

(3) Trial of varieties. This was intended to be a comparative one. With that object in view alternate drills were planted with a variety of 'Early Rose' in order that the yield of each of the varieties under trial

might be compared with the yield of a standard variety. Owing to the unfavourable season, and especially to the heat experienced during November, the variety chosen was almost an entire failure. Among the thirty-three varieties planted, 'Satisfaction,' 'Carman No. 1,' 'Burpee's Extra Early,' 'Adirondack,' and 'Extra Early Vermont' are the varieties giving most promise of being suitable for this climate. The variety called 'Satisfaction' deserves special mention. Its prolificness was quite remarkable. It is interesting to note in connection with this variety that Potatos imported from Tasmania under the name of 'Tasmanian Pink-eye' appear to be identical with the variety grown here as 'Satisfaction.'

H. G. C.

Primula and Primulastrum. By Charles Bailey (*Journ. Bot.* 485, pp. 145–149, 5 1903; pl. 451).—An address on the Oxlip, Cowslip, and Primrose, giving a diagram of their interrelations, with their allies and hybrids, and a map of the area of distribution of *P. elatior* in Britain.

G. S. B.

Primula rosea. By S. Arnott (*Journ. Hort.* April 2, 1903, p. 296). Mr. Arnott gives his experience of the cultivation of this rather troublesome Himalayan perennial. Mr. Arnott, after saying that moisture is necessary, recommends dividing the plants just after flowering, as giving the least trouble. A position sheltered from frost, which spoils the flowers when open, must be selected. It may be remarked that early and late flowering varieties should be looked out for and separated, as there is a full month in the difference of season between the earliest and latest.

C. W. D.

Pruning. The Stringfellow Method (*U.S.A. Hort. Soc. Minnesota Rep.* 1902, p. 33).—Mr. Stringfellow's method of cutting off the roots of trees and then planting the stub in a hole made by a bar has proved a failure, over 700 trees out of 1,000 planted in February 1900 having died.—*F. J. C.*

Pruning, Some Words on. By Augusto Ville (*Bull. R. Soc. Tosc. Ort.* 1, p. 17; January 1903).—In pruning fruit trees account has to be taken of mode of vegetative growth, of character of native climate and soil, of plant. Varieties with coarse, ill-formed, and short wood can as a rule be submitted to the process of pruning to a crown ("scudo"). Pruning to three eyes or buds possesses its advantages with fertile varieties like 'Duchesse d'Angoulême,' 'Beurré Clairgeau,' 'Fertility,' 'Passe Crassanne,' &c. In vines especially the Grapes produced on the short twigs are usually much larger than those on the long shoots. But in the varieties which are tardy in fruiting, especially when they are grafted on the wild stock, this method of pruning has the effect of immeasurably increasing the production of wood at the expense of the fruit; for, as a general rule, it is the extremity of the shoot which first begins to form fruit, this process then gradually extending nearer and nearer towards the centre of the tree. Some of the varieties demanding this long pruning are 'Curé,' 'Passe Colmar,' 'Belle Angevine,' 'Nec Plus Meuris,' &c. Both kinds of pruning can be combined in 'Bergamote Esperen,' 'Clapp's Favourite,' 'Soldat-Laboureur,' 'de Tongres,' by suppressing the thick shoots adjoining the

elongated fruit-bearing ones to within a few millimetres of the base, so as to cause the lower eyes to shoot out. For varieties with large fruits, like 'Williams,' 'Béarnaise,' 'Bonne d'Ezée,' it is necessary to bend back the shoots and tie them to the parent stem, the principle of this torsion being that, while the production of fruit is accelerated, active growth is at the same time retained. In nature, trees growing in the open cause thin branches to grow vertically until the term of vegetative growth has been reached, and no sooner has fruit-formation set in than they become more and more inclined towards the ground.

But one is often, according to the vegetative growth of the trees, obliged to prune to four, five, six, or seven eyes ; and the kind of pruning is also subject to the shape of the tree adopted, and to the climate and the soil.

Details are then given as to the best shapes and methods of pruning to be adopted with particular varieties mentioned. The age of the tree will also have an influence on the length of the fruit-bearing shoots which is to be maintained.

For the rapid obtaining of fruit, some varieties demand a much longer pruning from the first, while those which fruit readily require short pruning.

After a too dry season or hailstorms the pruning should be much shorter than if abundant rains had favoured woody growths.

From this it is clear that it is impossible to establish *a priori* a uniform system of pruning, and it is only by possessing a wide physiological knowledge combined with practice and judicious reasoning that one can hope to obtain the best and finest fruits.—*W. C. W.*

Prunus serrulata grandiflora, and Prunus Mume var. alba plena. By Albert Wagner (*Gartenflora*, p. 169, pl. 1513 ; 1/4/03).—Coloured plate of these two varieties of hardy ornamental *Prunus* from Japan. The former has large greenish-white flowers ; the latter, smaller pure-white flowers, which when just opening are a delicate rose colour.

J. P.

Prunus subhirtella. By W. J. B. (*Gard. Chron.* No. 846, p. 163, fig. 70; March 4, 1903).—The genus *Prunus* is well known for the beauty of many of its species when in flower. This charming species is one of the most recent additions to those already in cultivation. It is a native of the mountains in Japan, where it is much grown for the beauty of its flowers. "The original plant at Kew is now 12 or 14 feet high." The flowers are borne in clusters of from two to five ; each flower is about three-quarters of an inch in diameter, of a soft rosy-pink when first expanded, and becoming paler with age. The time of flowering is from the end of March to the middle of April, according to the season. It seems to be easily propagated by taking cuttings about the middle of June.

G. S. S.

Pyrethrum Powder as an insecticide. By A. M. (*Le Jard* March 5, 1903, p. 78).—In a dissertation on insecticides the writer says that none is better than Pyrethrum powder if it can be obtained genuine, but that it is frequently adulterated with deleterious substances. The

powder is supposed to be made from the powdered dried flowers of the *Pyrethrum cinerariæfolium*, a hardy perennial, easily raised from seed. It might answer for gardeners to make their own.—*C. W. D.*

Raspberry Cane Blight and Raspberry Yellows. By F. C. Stewart and H. J. Eustace (*U.S.A. Exp. Stn. New York, Bull.* 226, 12 1902; 6 plates).—Cane blight is caused by a fungus attacking the fruiting canes (occasionally the first season's canes), causing them either wholly or in part to die suddenly. It frequently starts in a small wound, and causes the death of the bark and the wood, thus hindering the passage of water; the wood becomes discoloured. The fungus was first attributed to a species of *Phoma*, but is now believed to be *Coniothyrium* sp. (probably *C. Fuckelii*, Sacc.), and its pycnidia and the exuded spores are extremely common on the dead and dying branches. The fungus is parasitic and is disseminated by means of infected nursery stock; by wind, rain, and washing of the soil; and in picking, pruning, and laying down the canes. Diseased canes should be removed and burnt.

Bluish-black areas are frequent on the stems of red Raspberries in August and September (generally near the ground), and are caused by a fungus called *Sphærella rubina*, Peck, but are in no way connected with the cane blight, and apparently do no harm to the plants.

'Raspberry Yellows' is a name applied to a disease especially attacking the Marlboro variety. The plants attacked are characterised by the dwarfed growth, small slightly curved leaves, mottled yellow colour suggestive of Peach yellows, much of the foliage withering, and the drying-up of the berries before ripening takes place, while those that ripen are undersized and insipid. The cause and remedy are not known; spraying has no effect.—*F. J. C.*

Raspberry Cane Maggot. By W. E. Britton (*U.S.A. Exp. Stn. Conn. Rep. of Entomologist*, part ii. 1902; 1 fig.).—The maggot of the two-winged fly *Phorbia rubivora*, Coquillett, bores into the canes in April, when the latter are only a few inches high, and tunnels only the pith, causing the wilting and death of the shoot. The only remedy is to cut out and burn the infested canes.—*F. J. C.*

Raspberry Shoots, Effect of Pinching back. By F. Cranefield (*U.S.A. Exp. Stn. Wisconsin, Rep.* 1902; 3 figs.).—The record of experiments extending over four years shows that in one variety, 'Gregg,' pinching the growing shoots at 18 ins. and 24 ins. increased the yield of fruit and the production of shoots, while pinching at 12 ins. had an injurious effect. In the 'Cuthbert' variety less fruit and fewer suckers were the results when pinching back was practised.—*F. J. C.*

Ravenelias of the United States and Mexico. By W. H. Long, Jr. (*Bot. Gaz.* xxxv. No. 2, p. 111; 2 plates).—This genus of *Uredineæ* seems to be mainly tropical and subtropical, only two species being found above lat. 38°. They are confined to the *Leguminosæ*, and chiefly *Cæsalpineæ* and *Mimoseæ*. Two species only occur on *Phyllanthus*. Twenty species are described.

Six species of *Pleoravenelia*, n. gen., are also described in detail, as well as one species of *Neoravenelia*, n. gen.—*G. H.*

Red Currant, An Unfruitful. By Dr. Ewert (*Gartenflora*, p. 210, figs. 27–32; 15/4/03).—Unfruitful Red Currants which bloom well but set no fruit are occasionally met with. Aitken investigated a case, and could not trace a definite connection of unfruitfulness to want of fertilising constituents in the soil.

Ewert noticed an example of an unfruitful bush among those which were normal, growing on the same soil, and was led to a study of the biology of the flower.

It was found that among the different varieties of Red Currants there is a great variation in the length of the style of the flowers, which leads to a physiological dicœcism. In the unfruitful specimens the width of the stigma was found much less than among fertile bushes.

J. P.

Regeneration, Further Studies in. By R. Goebel (*Flora*, xcii. 1903, pp. 132–146; 7 cuts).—(1) Regeneration and new-formation after injury are phenomena which pass into one another. The determining factor has been regarded as the *wound-stimulus* by Wiesner; but the facts rather point to the *separation* as the true stimulus. (2) The chief subjects of experimentation were *Bryophyllum*, *Begonia Rex*, *Streptocarpus Wendlandii*, and *Cyclamen*. An interesting parallel is drawn between the regenerative phenomena in *Melocactus* and in the fungus *Stereum hirsutum*. The whole paper is full of interest, but not suited to abstracting, as it is full of tersely put detail.—*M. H.*

Rhododendron brachycarpum. By Sir J. D. Hooker (*Bot. Mag.* tab. 7881).—Nat. ord. *Ericeæ*, tribe *Rhodoreæ*. Native of Japan. It flowered at Kew in 1902. It is a large, robust shrub, 6–10 ft. high, leaves 4–6 inches long. Flowers in a globose corymb. Corolla large, white, with a faint rose-pink blush in the medial line, reddening towards the tip. [In the plate the corolla is represented as of a pale primrose colour.]—*G. H.*

Rubber-producing Plants in Queensland. By Howard Newport (*Qu. Agr. Journ.* xii. January 1903).—This report is concerned chiefly with *Tabernæmontana crassa*, of which a consignment of 103 small plants was received in 1899, and of these 53 are still living. Some rubber has been obtained from these trees, and submitted to buyers of rubber for report. The opinion obtained is that the rubber is waxy, but if it can be produced expeditiously, and the quality improved by better methods of collection and coagulation, it is likely to prove a valuable introduction, as the tree readily adapts itself to conditions of climate, but hitherto the trees are disappointingly small.—*M. C. C.*

Rudicularia, a new Genus of Valoniaceæ. By F. Heydrich (*Flora*, xcii. 1903, pp. 97–101).—The definition of a new monotypic genus allied to *Apjohnia*, but possessing rhizoids; from the Loo-choo Islands. No cytological details are given.—*M. H.*

Ruellia macrantha. By Sir J. D. Hooker (*Bot. Mag.* tab. 7872).—Nat. ord. *Acanthaceæ*, tribe *Ruellieæ*. Native of Brazil. This is a branching soft-wooded shrub, 4–6 ft. high, with very large solitary flowers, and a bright rose-purple corolla, the trumpet-shaped mouth is 3 ins. across.

G. H.

Rhododendrons, Hardy. By Rudolph Seidel (*Gartenflora*, p. 72, 3 figs.; 1 2 03).—The author's father travelled in England in 1859, and stayed a year with John Standish at Bagshot, where many crosses of Rhododendrons were made.

For seed production crossings were made with *Rh. catawbiense*, *Smirnowi*, and *Metternichii*. These are all hardy but do not give white or rich red colours. To obtain red vars. *catawbiense* was crossed with *arboreum*, for white vars. *catawbiense* was crossed with *caucasicum*. In this manner the red 'Jay Gould' and 'Mrs. Milner' and white 'Boule de Neige' and 'Viola' were produced.

In raising seedlings the following practice is adopted. In May of the year following the crossing, the seeds are sown on a bed of peat under trees with not too much shade. The seeds are mixed with sand strewn broadcast on the bed, which is afterwards strongly pressed or rolled. Then a thin layer of fine earth is sifted over the seed-bed, pressed slightly again, and watered. After four weeks the seedlings are pricked out in a bed in the open. Here they remain for two years, being protected during winter with a layer of pine needles or peat.

In the third spring the seedlings are cut to one stem and planted out four inches apart. After flowering they are cut off just above the first leaf-whorl. Three to five shoots are then formed.

Rh. everestianum gave 20 per cent. rose, 5 per cent. white, and 35 per cent. lilac (like *catawbiense*) seedlings. *Everestianum* appears to be a hybrid between *catawbiense* and *ponticum*.

Rh. ponticum is apparently recessive; 95 per cent. of the seedlings were *catawbiense* in colour, and only a few plants like *ponticum*.

Only in crossings of *Rh. caucasicum* did three yellow seedlings appear; these are the first hardy yellow Rhododendron hybrids.—*J. P.*

Riviera, A Visit to the Gardens of the. By Prof. G. Roster (*Bull. R. Soc. Tosc. Ort.* 3, 4, p. 67; March–April 1903).—A list of the plants grown in the open at the most remarkable of the gardens from San Remo to Cannes is given, with descriptions of the gardens and plants concerned.—*W. C. W.*

Rodgersia pinnata. By Sir J. D. Hooker (*Bot. Mag.* tab. 7892).—Nat. ord. *Saxifragaceæ*, tribe *Saxifrageæ*. Native of China. A tall herb with digitately pinnate leaves. Flowers in a large panicle. Calyx externally red; petals none, and stamens with purple anthers.—*G. H.*

Rose 'Conrad Ferd. Meyer.' By J. Winkler (*Die Gart.* p. 283, March 14, 1903). How many new Roses are offered every year, all of them said to surpass the good old varieties! and in a short space of time these startling novelties are again forgotten, in fact many are quite worthless. In Rose 'Conrad Ferd. Meyer' we have, however, a very

distinct Rose, and so robust is it in strong Rose soil that, being also very thorny, it may even be planted as hedges for protection. On the Continent, especially in Germany, where most winters are so severe that Roses are killed to the root unless they are laid in the ground and then covered with straw, this Rose has stood without protection ; nor is it subject to diseases like other Roses. It keeps continually growing and flowering from May till November.—*G. R.*

Rose 'Crimson Rambler,' Successive Flowering of. By M. Yver (*Rev. Hort.* Jan. 16, 1903 ; p. 26).—Note on a grafted specimen at Dijon, which flowered normally third week in July, and equally strongly again in October, lasting through a frost until end November. Remarks reoccurrence of pink and pure white flowers in this Rose in small groups, so far not fixable.—*C. T. D.*

Rose, The Perfume of the (*Chambers's Journal*, May 1903).—"It is stated to be perfectly certain that under no conditions is the odour of the Rose fully developed except in very hot climates ; yet such is not the climatic condition of the great seats of Rose-farming in Europe. Turkish attar of Roses, for instance, is mainly produced in Bulgaria, and is carried on in the fertile valleys on the southern slope of the Balkans. In this region, where wheat and the ordinary cereals are produced, there is cold and snow in winter, abundance of moisture in the spring and autumn, and drought in summer.

"The Roses employed for attar-making in Europe are : in Bulgaria, the Red-damask Rose, and in the South of France the Provence Rose, a hybrid or variety of the Hundred-leaved Rose (*Rosa centifolia*), to which also belongs the well-known Cabbage Rose. These Roses are both spring-bloomers, though the Damask Rose has a short autumn season as well, and their bloom lasts for only about a month."

The writer adds that what is wanting to make Rose-farming popular is a perpetual bloomer, which will have the requisite quantity and quality of oil, and will give work for five or six months on a plantation. Such a Rose would be as popular among horticulturists for general garden decoration as for the production of oil for the manufacture of scent.

R. D.

San José Scale : Natural Enemies in Connecticut. By W. E. Britton (*U.S.A. Exp. Stn. Conn., Rep of Entomologist*, part ii. 1902 ; 2 figs.).—The twice-stabbed lady-bird (*Chilicorus bivulnerus*, Muls.), a black lady-bird (*Pentilia misella*, Leb.), and a fungus probably a species of *Capnodium* are reported as causing reduction in the number of scales on infested trees.—*F. J. C.*

San José Scale Investigations. By V. H. Lowe and P. J. Parrott (*U.S.A. Exp. Stn. New York, Bull.* 228, 12/1902 ; 7 plates).—Experiments were made with various washes, including resin washes, lime-water and kerosene wash, lime-sulphur-salt wash and casein, and potash-sulphur wash, but none gave better results than the lime-sulphur-salt wash (recipe in *Journ. R.H.S.* xxvii. 1190). This spray was uniformly successful in all the localities where it was tried in New York State.

Summer spraying of Japan Plum trees with the wash, made in the proportion of one pound of sulphur to ten pounds of lime, resulted in killing the scales without injuring the foliage.

Experiments in making a lime-sulphur wash by using caustic soda or potash, to avoid the necessity of boiling, gave promising results. The lime was slaked with warm water, and the sulphur, which had been made into a thin paste, was added, and thoroughly mixed with the slaked lime; then from ½ to ¾ as much caustic soda as lime in the compound is added and the necessary quantity of water poured in as chemical action goes on. Further experiments are required before the formula can be fixed. The lime-sulphur-salt wash kills the scale-insects by its soluble compounds acting as a contact poison, and by its compounds forming a crust preventing the development of the young scales.—*F. J. C.*

San José Scale, Plants infested by. By W. E. Britton (*U.S.A. Exp. Stn. Conn., Rep. of Entomologist*, part ii. 1902).—A list of plants (1) commonly or badly infested, (2) occasionally or rarely infested, (3) not infested, has been compiled by means of a circular letter to the entomologists of the various States. Seventy-two are placed in the first group. The Apple, Pear, Peach, Japan Plum, Currant, Sweet Cherry, European Plum, Quince, and Gooseberry among fruits, and the Purple-leaved Plum, *Crataegus*, Japanese Quince, Mountain Ash, Red-twigged Dogwood, *Rosa rugosa*, Poplar, Persian Lilac, *Cotoneaster*, Elm, and Osage Orange among ornamental trees, are mostly frequently infested in Connecticut: 66 are placed in the second group and 76 in the last.—*F. J. C.*

San José Scale: Spraying Experiments. By W. E. Britton (*U.S.A. Exp. Stn. Conn., Rep. of Entomologist*, part ii. 1902).—Both kerosene and the lime-sulphur-salt wash mentioned in previous abstracts (*Journ. R.H.S.* xxvii. 787) were found to be effectual remedies when applied before the buds burst. In spraying with kerosene a bright day in early spring is the best. Bearing trees in a large orchard were sprayed effectively with the lime wash at a cost not exceeding 11 cents per tree.—*F. J. C.*

Sanseviera grandis. By Sir J. D. Hooker (*Bot. Mag.* tab. 7877).—Nat. ord. *Hæmodoraceæ*, tribe *Ophiopogoneæ*. Native of tropical Africa? This noble species of 'Bowstring Hemp' was cultivated for fibre in Cuba, the fibre being fine, white and silky, of extraordinary strength. The leaves are few, very large, 3–4 ft. long and 6 ins. broad, spreading and rosulate. The scape is 2 ft. high, with a panicle 2–3 ft. long.—*G. H.*

Sassafras, Notes on. By E. W. Berry (*Bot. Gaz.* xxxiv. No. 6, p. 426). The author shows the variability in the lobing of the leaf of the living plant, and discusses the fossil types referred to *Sassafras*, pointing out the impossibility of trusting to them in all cases. Thus, of 28 American forms referred to *Sassafras*, only six can be retained.—*G. H.*

Sawfly, The Radish. By Dr. P. Marchal (*Le Jard.* March 20, 1903, p. 85). A life history of this pest, *Athalia spinarum*, is given, with engravings, and recipes for the best remedies.—*C. W. D.*

Saxifraga Griesbachii. By E. Jenkins (*Gard. Chron.* No. 843, p. 123, fig. 53 ; Feb. 21, 1903).—This new Saxifrage is a native of Turkey, and was found in Albania and Macedonia at an elevation between 4,000 and 5,000 feet. Among the chief points of interest and beauty is the purplish-crimson colour of the miniature blossoms. From quite an early stage a purplish-red tint is visible in the inflorescence, even before it emerges from the crustaceous rosette. The peduncles are about 4 ins. long.—*G. S. S.*

Saxifraga ligulata. By R. Dean (*Journ. Hort.* Feb. 26, 1903, p. 184).—This is recommended for cultivation in suitable situations on account of its early and neat habit.—*C. W. D.*

Scab of Apples and Pears, and Remedies. By Dr. Friedrich Krüger (*Gartenflora*, p. 602, figs. 124, 125, and 134 ; 15/11/02).—One of the commonest and most troublesome diseases of Apples and Pears is scab, due to two very closely related species of *Fusicladium*, viz. *F. dendriticum* (Wallr.), Fckl., on Apples, and *F. pirinum* (Lib.), Fckl., on Pears.

On the fruits the fungi produce the well-known rounded scabs or specks, which are at first blackish green ; later the flecks become dark at the edges and corky in the middle. On the leaves are sooty patches, which in the Pear are chiefly on the underside, while in the Apple they are mostly met with on the upper surfaces. The young shoots are also damaged by the fungi, more particularly those of the Pear.

The following methods of prevention and remedies are suggested :

(1) Choice of resistent varieties. Some varieties are more easily attacked by the fungus than others.

(2) Good cultivation and adequate manuring of the trees should be practised.

(3) All infected "scabby" young shoots should be cut off and burnt, and dead fallen leaves on which the fungus is present should be collected and burnt also.

(4) Spraying with a 2 per cent. Bordeaux mixture just before the leaf-buds open in spring and again when the fruit is set.—*J. P.*

School Gardens. By F. M. Powell (*U.S.A. Hort. Soc. Minnesota, Rep.* 1902).—Advocates the introduction of "School Gardens" in all schools, gives some account of the history of school gardening, and suggests a plan to be carried out.—*F. J. C.*

Seed-dispersal of a Grass. By M. Nieuwenhuis-Uexküll (*Ann. Jard. Bot. Buit.* Ser. II. vol. iii. 1902, pp. 114–121 ; 2 plates).—A description of the modification of the axis of the spike of a grass (*Thuarea sarmentosa*) to secure dispersal of the fruit by prolonged flotation in sea-water.—*P. G.*

Seeds, Old, Advantages of sowing in certain cases. By Jules Rudolph (*Rev. Hort.* March 1, 1903, p. 207).—Advantageous especially with Vegetables and Melons, retarding running to seed and improving root-formation.—*C. T. D.*

Sempervivum urbicum. By Sir J. D. Hooker (*Bot. Mag.* tab. 7893).—Nat. ord. *Crassulaceæ*. Native of the Canary Islands. It inhabits rocks, walls, and roofs in Teneriffe. It flowered at Kew in 1902. Leaves are rosulate, 4–6 ins. long, 1½ in. broad. Panicle, very large, 3 ft. high. Flowers with a pale yellow corolla, ¾ in. in diameter.—*G. H.*

Sisyrinchium paniculatum (*Journ. Hort.* April 30, 1903, p. 376). This native of Australia, otherwise known as *Libertia paniculata*, is much praised as a greenhouse bulb, with a panicle of flowers of dazzling whiteness. It is grown in the border of the temperate house at Kew.
C. W. D.

Snow: Influence in causing Seeds to Germinate. By G. Magne (*Le Jard.* Jan. 20, 1903, p. 21).—It is said that snow has a special influence in promoting the germination of seeds, not only of Alpines, but of border perennials and annuals. The writer sowed seeds of many species, in the latitude and altitude of Paris, under snow in the middle of November; most of them germinated within a month, including such tender kinds as *Primula verticillata*. The writer ventures a confident opinion that the same seeds kept till spring and then sown in the open ground would have germinated very slowly, if at all.—*C. W. D.*

Soils we Cultivate, The. By J. J. Willis (*Gard. Mag.* n. 2576, p. 169; 14/3/03, and following numbers).—A series of articles dealing with the constituents of garden soils, in which the subject is discussed from a scientific and practical point of view. They are worth the perusal and study of all engaged in soil cultivation.—*W. G.*

Sophora viciifolia. By Sir J. D. Hooker (*Bot. Mag.* tab. 7883).—Nat. ord. *Leguminosæ*, tribe *Sophoreæ*. Native of China. It flowered at Kew in 1902. A low, much branched spinescent herb, 2–4 ft. high, pinnate leaves, and a purple calyx and white corolla.—*G. H.*

Spanish Chestnut Trees, Disease of. By P. Hariot (*Le Jard.* April 20, 1903, p. 122).—A disease caused to the root of the Spanish Chestnut by a fungus, *Mycelophagus castaneæ*, is very prevalent in the South of France.—*C. W. D.*

Sphedamnocarpus pruriens. By Sir J. D. Hooker (*Bot. Mag.* tab. 7894).—Nat. ord. *Malpighiaceæ*, tribe *Banistericeæ*. Native of South Africa. It is a lofty, climbing shrub, with silkily tomentose branches. Leaves 1–4 ins. long. The flowers sub-corymbosely clustered, with crisped petals of a golden-yellow colour.—*G. H.*

Spigelia splendens. By G. Bornemann (*Die Gart.* p. 363, May 2, 1903). *Spigelia marilandica*, a North American species, is quite hardy in England. It has bright scarlet and yellow flowers, and is very showy. But still more effective is the tender *Spigelia splendens* of Guatemala. It has a compact growth, with large ovate leaves, and well above the ornamental foliage are a number of racemose flowers, which are bright red with white tips. The plant is raised from seed, and is as easily grown as the Scarlet Lobelia. Though such a showy plant, it is rarely seen in cultivation.—*G. H.*

Spray Calendar (*U.S.A. St. Bd. Hort. Oregon Report*, 1901–2, p. 70). This article was prepared to answer the questions so often asked, when, how, and what to spray, and what to spray for. Full directions are given (as a result of extensive experiments) for such pests and diseases as San José scale, green aphis, Pear-leaf blister mite, bud moth, clover mite, crater blight, Plum rot, codlin moth, &c. Amongst the spraying mixtures described are sulphur, lime, and salt, resin wash, Bordeaux mixture, arsenite of lime, &c. Valuable information and results are given which cannot fail to repay careful perusal. For instance, resin wash is described by Professor Koebele as a summer spray for all scale insects, woolly and green aphis. The ingredients are : resin, 4 lb. ; sal soda, 3 lb.

Directions.—Boil in three pints of soft water until dissolved, then add 50 gallons of hot water. Apply cold or lukewarm This spray is not injurious to the tree, for after three or four days of sunshine it dissolves, and leaves the pores of the bark open. A good article is also added by Professor C. O. Townsend on Spraying for *Fungi.*—*V. J. M.*

Spray Formulas (*U.S.A. St. Bd. Hort. Oregon Report*, 1901–2, p. 92 ; table).—Formulas are given of fourteen spraying mixtures : arsenite of soda, Paris green, and arsenite of lime for chewing insects, *e.g.* caterpillars ; sulphur, lime, and soda, sulphur, lime, and salt, and quassia chips for sucking insects ; Bordeaux mixture and copper sulphate for fungicides. Combined fungicide and insecticide sprays are given and are for Rose mildew, red spider, and plant lice. A useful tabulated calendar is added.

V. J. M.

Spraying in Bloom. By Prof. S. A. Beach (*Proc. Am. Pom. Soc.* 1901, p. 70).—Paris green poisons bees, but Bordeaux mixture does not apparently. The application of ordinary spray mixtures to open blossoms may stop the further development of the blossom. With Apples and Pears having abundance of flowers, spraying once in the blooming season has thinned the fruit ; spraying repeatedly so as to hit the blossoms as they opened from day to day has practically destroyed the crop of fruit.

C. H. H.

Spraying Orchards, Some Essentials in. By Prof. H. L. Price (*U.S.A. Hort. Soc. Virginia Report*, 1902, p. 209).—To make Bordeaux mixture four pounds of copper sulphate is dissolved in one vessel and five pounds of quicklime is slaked in another : these two substances are then poured into a fifty-gallon barrel, already nearly filled with water. The barrel is then quite filled and is ready for work. Stir thoroughly whilst adding the copper sulphate and lime.—*C. H. H.*

Spruce Trees, Stag-headed. By C. von Tubeuf (*Nat. Zeit. Land-Forst*, i. pp. 1–9, 1903 ; 4 figs.).—Numerous Spruce trees near Munich were observed with the upper branches dying off, while the lower part of the crown remained healthy. The cause was not the Pine bark beetle or other insect ; nor could the dying off be traced to fungi. The symptoms are described and figured in a coloured plate, and the damage is ascribed to lightning. This conclusion is founded on results of the late Professor Robert Hartig, although the cases under consideration differ somewhat from any described by Hartig.—*W. G. S.*

Stem of Monocotyledons, The Formation of. By J. C. Schoule (*Flora*, vol. xcii. 1903, pp. 32–48, T. iv.).—The growing point of all monocotyledons is a thick cone; but as its primary growth is slow, the stem at first formed by it is thin. Owing to a gradual increase of the diameter of the growing point in the Palm type, the lower part of the stem forms an inverted cone. The greater part of the wide base of the adult growing point is occupied by a cambium, in which parenchyma and fibrovascular bundles are formed on the inner side. In the arborescent *Liliiflorœ* this cambium layer is continued down the stem, and by its intensified growth below converts the inverted cone into a cylinder. The author gives interesting measurements and references.—*M. H.*

Stigeoclonium, Young Plants of (*Beih. Bot. Cent.* xiii. ht. 4, p. 368; 2 plates).—Dr. F. E. Fritsch describes the development of this Alga from specimens obtained in Kew Gardens. A new variety is also described. Those *Herposteiron* species which have distinctly septate hairs are believed to be stages in the life history of the above genus. *Endoderma* species (epiphytic and endophytic) may also be connected with *Stigeoclonium* spp. A bibliography is given.—*G. F. S.-E.*

Strawberry, A new Pest of the. By F. L. Washburn (*U.S.A. Hort. Soc. Minnesota, Rep.* 1902).—The beetle *Harpalus pennsylvanicus*, hitherto looked upon as a carnivorous beetle, has developed a taste for Strawberries. Other species of the genus *H. caliginosus* in Ohio (1900) and *H. ruficornis* in Holland and in England (see Miss Ormerod's Reports 1894–95 and 1897–99) are also reported as injuring Strawberries. A lantern trap is suggested as a means of attracting the insects; hand picking from under the mulching or from under boards placed on the earth is also recommended.—*F. J. C.*

Strawberries, Tests of. By O. M. Taylor (*U.S.A. Exp. Stn. New York, Bull.* n. 218, November 1902; 1 plate).—A minute account of experiments with fifty-six varieties of Strawberry on the Station grounds at Geneva, with tables of temperature and rainfall, and of season and yield in the Strawberries under observation.

The records were made in 1902, when several late frosts did serious damage to the blossoms even in the early bud stage. On the other hand, the rainfall was ample during the fruiting season, so that the plants at no time suffered from lack of moisture, which doubtless increased the yield of some of the varieties. The plants were, whenever possible, procured from the introducer or originator to ensure their being true to name, and were planted in the spring of 1901, but not allowed to fruit that year.

The tests proved 'Crescent' to be the largest and heaviest bearer, and therefore, considering the season, probably also the hardiest. No very early variety was grown, but 'Crescent' was one of about nine which were ready for a first picking by June 18.—*M. L. H.*

Sugar Beet, Bacterial Disease of. By Hedgecock and Metcalf (*Zeit. f. Pflanz.* xii. pp. 322–324, 1903).—A preliminary note on a disease which caused loss to the Sugar Beet crop in 1901 in Nebraska, Arizona,

and Colorado. The root becomes rotten at the tip, and rots upwards. In the later stages, a transparent bacterial fluid was abundantly present, which smelt strongly of acetic acid. The organism proved to be a bacterium, which grew best under anaërobic conditions, and could produce the disease when healthy roots were infected with it. The disease occurs on wet undrained soils, and has not been found where drainage is good. It can also destroy roots stored in heaps.—*W. G. S.*

Sugar Beet in Nebraska, Culture of. By T. L. Lyon and A. T. Wiancko (*U.S.A. Exp. Stn. Nebraska, Bull.* No. 73, 3/1902).—An account of the cultivation of Sugar Beets upon a large scale (over 2,000 acres) during 1901. The experiments in testing varieties, fertilisers, and various methods of cultivation were continued, together with an examination of the moisture contents of soils under different conditions &c.

The season's experience taken as a whole showed that Sugar Beets may be considered superior in drought-resisting qualities to any other field crop, except Alfalfa.

The comparison between light and heavy soils shows that sugar content, purity, and yield were higher on the heavy soil; but, owing to the severe caking effects of a prolonged drought, the average results were slightly in favour of the lighter soil, which was in better condition.

Tests of different fertilisers, in various quantities and combinations, showed that the yield is slightly increased by their use, but that they make no difference in the sugar content and purity of the juice.

Various methods of cultivation tend to show that, to be effective, a mulch of 3 or 4 ins. deep must be maintained, but deeper cultivation is apt to interfere with the fine lateral roots of the Beets.

The most satisfactory distances in planting are 18 ins. between the rows and 8 ins. between the plants. This allows of horse cultivation.

Comparisons between late and early planting are in favour of the latter (which extends from April till the third week in May), except where trouble has been experienced from "leaf-spot," which is apt to attack early-planted fields, especially on light soils.

Cultivation when the plant is in full growth, although somewhat detrimental to the leaves, increases the average weight of the Beets, especially when the ground has become caked.

Wet weather after the Beets have ripened generally lessens the sugar contents, but increases the weight, so that it is the manufacturer who loses, not the farmer. This is not the case when buds form on the crowns; the Beets should then be harvested as soon as possible before they deteriorate.

Diseases, such as "leaf-spot" (*Cercospora beticola*) and a form of root-rot (*Phyllosticta*), were treated, the former by spraying with Bordeaux mixture; the latter by plentiful applications of fresh lime. The results were satisfactory, though not conclusive.

Insects, such as the striped blister beetle and grasshoppers, were effectually provided for with Paris green and lead arsenate.—*C. H. C.*

Sugar-cane, Improvement of Races of the, by Selective Vegetative Propagation. By J. D. Kobus (*Ann. Jard. Bot. Buit.*

Ser. II. vol. iii. 1902, pp. 17–80. Tab. 11).—This laborious and detailed paper on "The Chemical Selection of the Sugar-cane" is worthy of close study by every breeder of plants, for it gives an account of an attempt to produce by cuttings a race of Sugar-cane that should display an increased vigour by an increased yield of sugar and by an increased power of resisting (sereh-) disease. The conclusions drawn obviously have a very important bearing upon cultivated herbs that are propagated vegetatively rather than by seeds.

The conclusions arrived at may be summarised as follows :

1. The amount of sugar in the individual haulms of one sugar plant was apt to vary greatly. The author selected for propagation plants that exhibited small variations, and he suggests that greater success might attend analogous attempts at improvement in the Potato were more attention paid to the amount of starch in the whole of the tubers rather than in individual tubers.

2. The variability of the amount of sugar in the different varieties was greatest in thick-stemmed varieties that had long been in cultivation, and least in young ones more recently selected from seed.

3. The amount of sugar in the cane varied directly with the weight of the same.

4. Heavy plants gave rise to heavy offspring. The same character has been shown in reference to the Potato.

5. The descendants of plants rich in sugar were richer in sugar and heavier than unselected plants.

6. But the simple selection of cuttings of heavy plants did not lead to the production of forms markedly richer in sugar, though the resulting plants were in general richer in sugar. Indeed, heavy plants poor in sugar seemed to have a much worse effect on the amount of sugar in the progeny than did light plants poor in sugar.

7. Extreme care had to be exercised in the selection of the ground on which the experiments were made; for even on an apparently uniform soil great differences were apt to appear in the individual plants merely in consequence of local variations in the soil.

8. A most important discovery was made, namely, that the increased vigour as reflected in the larger yield of sugar was accompanied by greater immunity from the sereh-disease.—*P. G.*

Sugar-cane, Table Syrups from. By H. W. Wiley (*U.S.A. Dep. Bur. Agr. Chem., Bull.* No. 60, 1902; illustrated).—Sugar-cane was introduced more than a hundred years ago into the United States, and since then its use in manufacturing table syrups has become widespread, and is now practised in Southern Texas, Louisiana, Southern Mississippi, Alabama, Southern Georgia, South Carolina, and the whole of Florida.

The chief difficulties in connection with this manufacture are, lack of uniformity in method, the tendency of the syrup to ferment in warm weather, and the presence on the market of artificial syrups sold under misleading names.

In Georgia the finished product often crystallises, which detracts from its appearance. Cutting and piling the canes for some time before use

diminishes this tendency by affording an opportunity for the inversion of some of the Cane sugar.

In most of the factories no attempt is made to chemically purify the juices, dependence being entirely placed on heating and skimming; but in the mill of Messrs. Wright in Cairo (Georgia) the juices are sulphured cold and then lime added almost to neutrality (as practised in sugar-making in Louisiana), which clears and does not darken the resulting product.

An address by the author on "Cane and Cassava Culture in Florida" is included in the pamphlet, together with notes on soils in various States and their analysis, analyses of Sugar-cane, and finally the consideration of problems which need further study.—*C. H. C.*

Summer Gardening (*Garden*, No. 1643, p. 327; 16/5/03).—The death-blow was given to the old bedding-out system, not by the plants which were used, for in themselves they were beautiful, but by the commingling of crude colours entirely antagonistic, and intolerably dull in their perpetual reiteration. But bedding-out must, and always will, remain an essential part of a certain type of garden, if not of all.

Nothing can be more charming, yet what more simple, than beds of the common monthly Rose pegged down and flowering profusely at a height of about 2 feet or so from the ground level. Banks and beds of these are extensively used at Florence, and once seen can never be forgotten. What is there to prevent such delightful every-day things doing equally well and being more long-lived in our own cooler, moister climate, and yet how seldom are they seen in mass in our English gardens!

E. T. C.

Sunlight injurious to Seeds. By M. Emile Laurent (*Le Jard.* June 20, 1903, p. 83).—It has been found by experiments that seeds exposed for some days to bright sunshine have their germinating power retarded, and sometimes destroyed.—*C. W. D.*

Sweet Corn Culture. By B. W. McKeen (*U.S.A. Exp. Stn. Maine, Quarterly Bull.* vol. ii. 1).—Green sward on light land ploughed six inches deep is the best. The land is thoroughly broken up by means of harrows. The corn is planted in drills, 3 feet apart, about 8 qts. of seeds to the acre; about 450 lb. of a standard brand of phosphate per acre. Weeding is thoroughly carried out before the corn comes up, and when the corn is six inches high the cultivator is used. Clover and grass seed are sown in the corn at the end of July. The stalks are cut and made into silage.—*F. J. C.*

Sweet Peas. By E. Molyneux (*Gard. Mag.* n. 2571, p. 85; 7/2/03).—Now that the varieties of Sweet Peas have become so bewilderingly numerous, it is an advantage for someone to make a selection to aid the puzzled amateur. The writer has, no doubt, had difficulty in making a selection where all are beautiful, and the result is that his list is far too large for gardens of modest size, and it might be narrowed down to almost a score. The cultural notes are practical and clear.—*W. G.*

Symbiosis of an Alga with a Sponge. By S. H. Koorders (*Ann. Jard. Bot. Buit.* vol. iii. pp. 8–16 b ; 1901).—*P. G.*

Syringa Emodi. By F. Burvenich père (*Rev. Hort. Belge*, xxviii. No. 9, p. 193; col. pl.).—This is a shrub with very large elliptic-lanceolate leaves and small white flowers, having a disagreeable odour.—*G. H.*

Table Mountain in Spring, Flora of. Engler (in *Not. König. Bot. Berlin, Appendix* xi. ; April 1, 1903).—This is an interesting account of the journey in South Africa made by the author in connection with his plan for arranging the plants of the new Botanical Gardens at Dahlem-Steglitz according to their geographical distribution. It was given as a lecture, and then expanded with notes on the South African flora in general, and illustrations of some of the more striking plants in particular, many of the latter from the well-known *Pflanzenfamilien.*

After carefully comparing the different systems proposed the author has adopted that of the *Flora Capensis* of Kew as the most satisfactory classification of the floral regions, especially in the fusion of the Karroo and "Roggeveld" into one Central Region. Engler then treats of the several sub-regions—(1) the South and South-east African coast lands ; (2) the above-named Central Region ; (3) the South-east African Highlands of the Orange, Transvaal, and Kalahari regions ; and (4) Western Namaqua and Herero lands—in detail, and the whole comprises a very interesting summary of the subject, in which botanists and horticulturists will renew their acquaintance with many interesting types, for the most part well known in our larger collections.—*M. W.*

Taphrina, Spore-formation in. By S. Ikeno (*Flora*, vol. xcii. 1903, pp. 1–31, T. ii.–iii. ; 2 cuts).—*Taphrina* (*Exoascus*) is a genus of Ascomycetes whose hymenium is constituted by the simple outgrowth of the asci through the epiderm on which they grow. The nucleus of the young ascus is constituted by the fusion of two, as first shown by Dangeard. This conjugation nucleus then becomes disorganised, and gives off the greater part of its chromatin to the cytoplasm, which apparently digests it ; the remainder, having many resemblances to a nucleolus, lies as a free single chromatin body in the nucleus. In *T. Johansoni* and *Kusanoi* the chromatin body undergoes fragmentation by a sort of budding, the minute fragments behaving as so many nuclear centres around which the cytoplasm concentrates to form the spores, while the larger ones are digested by the cytoplasm. In *T. cerasi, pruni,* and *deformans* (including var. *armeniaca*) the chromatin body divides three times in succession to form the 8 spore-nuclei, a very simple karyokinetic process being recognisable in the first two. Epiplasm is left around the spores. The author discusses the homologies of the nuclear vacuole, which contains diffuse chromatic substance, and the chromatic body ; and compares the former with the similar structure observed by Wager in the Yeast. He notes the occasional formation of a clear space round the nucleolus in higher plants, as an artefact due to fixation. The microchemical reactions of the "chromatin body" are somewhat different from those of a nucleolus on the one hand, and of Zacharias's nuclein on the other.—*M. H.*

Taro Root-rot. By T. F. Sedgwick (*Hawaii Exp. Stn., Bull.* 2, 1902; 2 plates).—This bulletin gives a history of Taro (*Colocasia antiquorum esculenta*), with some account of the general mode of culture. The rot causes in some localities the loss of half the crop. It is due either to adverse soil conditions or to a fungus. The remedy suggested is improved cultivation, as it is found that when this is carried out in the best way the disease does not attack the plants.—*F. J. C.*

Tea Rose 'Souvenir de Pierre Notting.' By Ch. Pynaert (*Rev. Hort. Belge*, xxviii. No. 5, p. 108; coloured plate).—A beautiful flower of a salmon tint, originating with and issued by MM. Soupert et Notting of Luxembourg. It is a cross between 'Maréchal Niel' and 'Maman Cochet.'

G. H.

Tetratheca ericifolia, Smith. By E. Bedinghaus (*Rev. Hort. Belge*, xxviii. No. 6, p. 121; col. pl.).—It is a plant with Heath-like foliage and dense spikes of reddish-lilac flowers.—*G. H.*

Tigridia (*Journ. Hort.* April 9, 1903, p. 317).—A life-size portrait of these gorgeous and old-fashioned flowers is given. They have a short-lived beauty and require almost annual renewing.—*C. W. D.*

Tobacco, Mosaic Disease of. By D. Iwanowski (Warsaw) (*Zeit. f. Pflanz.* xiii. pp. 1–41, 3 plates; 1903).—The symptoms are greenish-yellow irregular spots on leaves of cultivated Tobacco, and more or less distortion of the plant. The disease has already been investigated several times, but its cause has not been quite cleared up. The author shows that it can be transmitted by infection and is caused by a bacterial organism, the life-history of which is to be investigated and described in a future paper. The coloured plates give a good idea of the appearance of the leaves when attacked, also the appearance of the bacterial colonies in the plant and on culture-plates.—*W. G. S.*

Tomato. By E. J. Kyle and E. C. Green (*U.S.A. Exp. Stn. Texas, Bull.* 65, 1/1903; 6 figs.).—A complete account of the raising of Tomatos, with notes on their diseases and the different methods of marketing.

F. J. C.

Tomato, Sleeping Disease of. By George Abbey (*Garden*, No. 1643, p. 337; 16/5/03).—Sleeping disease of Tomato was first recorded from the Channel Islands. It is very destructive in Guernsey. In recent years it has occurred all over the British Islands.

The plants first give indications of attack by the dull or leaden colour of the foliage, and presently the leaves begin to droop. Shortly afterwards the stem collapses, especially at the lower part, and the plant goes off altogether. Sometimes, however, it makes a great effort to supply itself with nourishment by pushing adventitious roots from the stem above ground, and in some instances a surface dressing of soil placed round the stem has resulted in the maturing of the fruit already set and swelling on the plant. The attack is more frequent after fruit is present than before, though the parasite assails the seedlings, and in all

stages of growth, but commonly its effects are not pronounced until the flowering and fruiting stages.—*E. T. C.*

Tomato, Black Spot on the. By George Abbey (*Garden*, No. 1645, p. 359; 23/5/03).—More or less present wherever the Tomato is cultivated is the disease known as 'black spot' or 'black stripe.' It is caused by the parasitic fungus *Macrosporium Tomato*, but is closely allied to the Potato leaf-curl fungus, *M. solani*. The fruit is most frequently attacked, but the fungus is also often present on the stem, producing the well-known 'black stripe,' and on the leaves, causing the condition termed 'curl.'

The fungus has been regarded as a wound-parasite, getting into the tissues of the plant through minute cracks in the cuticle or skin. This is emphasised by the fact that the fruit is usually affected round the style, or at the point of insertion of the stem, where minute cracks frequently occur. The fungus, however, appears on any part of the fruit and also on any portion of the stem and leaves. It appears that the chief seats of disease are where moisture has rested for some time, and the germ-tube of a spore of the fungus being present may either have entered by a minute crack in the cuticular cells or directly pierced the softened cuticle.—*E. T. C.*

Tomato: Recherches sur le Glœosporium phomoides, parasite de la Tomate. Par M. F. Gueguen (*Bull. Soc. Myc. de Fr.* xviii. fasc. iv. 1902, pp. 312–327; with two plates, and figs.).—Commences by showing that *Sphæronema Lycopersici*, Plow. (*Gard. Chron.* Nov. 12, 1881) is the same species as *Glœosporium phomoides*, Sacc., which occurs on the pericarp of the fruit of the Tomato, and produces conidia which are oblong-clavate, attenuated below, and rounded above (10–12 × $2\frac{1}{2}$–3 μ) with two guttules. This communication further intimates the production of pycnidia, which are larger than the conidia. Chlamydospores are also produced at the same time. It is admitted to be difficult to decide whether this *Glœosporium* is truly a parasite or only a saprophyte.—*M. C. C.*

Transvaal. By R. F. Rand (*Journ. Bot.* 486, pp. 194–201, 6/1903). Further "Wayfaring Notes" by Dr. Rand on plants, mostly new species, sent home by him and described by Mr. Spencer Moore and others, with regard especially to the mechanisms for pollination.—*G. S. B.*

Transvaal, Gardening in the. By C. F., Johannesburg (*Journ. Hort.* March 12, 1903, p. 232).—The conditions under which gardening is conducted in this new colony are discussed. Rainfall at Pretoria is about twenty-six inches. Natives make fairly good garden labourers. Fruit includes Peaches, Pears, Apples, Oranges. Drawbacks are hailstorms and locusts, which utterly destroy all vegetation met in their course.

C. W. D.

Trees, The Care of Old. By W. J. Bean (*Garden*, No. 1636, p. 211; 28/3/03).—The two most potent factors in the destruction of old trees are storms and fungoid parasites. Nothing is more grievous than to

have a favourite tree from which every violent storm wrenches a limb or a branch. A good deal may be done in the early training of a tree so to control its building up that it may best withstand the violence of gales; and the most important matter in this connection is the development of a strong erect trunk—a central axis of such height and strength and bulk as to be capable of supporting its head of branches easily. It is advisable, therefore, always to prevent the premature forking of the trunk in important trees. In other words, the leading shoot should always be watched, and, by the repression of any rival leaders that may appear, allowed to retain its predominance. This is by no means so troublesome a matter as might appear, for when once a strong leading shoot has been developed it usually keeps its place till the tree begins to assume the shape natural to it.—*E. T. C.*

Tulip Disease, The. By A. D. H. (*Gard. Chron.* No. 845, p. 145; March 7, 1903).—The well-known disease of Tulips commonly known as the 'Tulip disease' is well described in this article: its effects had been known for many years, but the cause has only comparatively recently been found out. The fungus known as *Botrytis*, or *Sclerotinia parasitica*, has been described by various authors in this country. The writer of this article appears to be under the impression that Dr. Ritzema Bos, the well-known zoologist, was the first to thoroughly investigate this disease, the result of which investigations he has published in the current number of the "Centralblatt für Bacteriologie"; but a very good account of this disease, by Mr. Massee, had already been published in the JOURNAL R.H.S. xxvi. 1901, p. 43.—*G. S. S.*

Tulips, New. *Tulipa Micheliana* and *T. Wilsoniana.* By Ed. Andrée (*Rev. Hort.* May 1, 1903, pp. 206, 207; coloured plate).—Description of two new introductions from Persia by M. Van Tubergen, Haarlem. *T. Micheliana* is brilliant scarlet, foliage striped with brown until maturity, base of petals a black lanceolate patch, bordered with yellow. *T. Wilsoniana* scarlet, leaves undulate, with narrow brown margin. Both very handsome.
C. T. D.

Upland Plant Societies, Distribution of, in Kent County, Michigan. By B. E. Livingston (*Bot. Gaz.* xxxv. No. 1, p. 36; with map).—The author commences by describing the climatology and geology of the county, this being mainly glacial drift, with three well-marked terminal moraines. There are five Plant Societies, termed: (1) The Beech-Maple; (2) Maple-Elm-Agrimony; (3) Oak-Hickory; (4) Oak-Hazel; (5) Oak-Pine-Sassafras. Each of these societies is considered with their accompanying plants. Generalising on the upland flora, this is based primarily upon the nature of the superficial soil, and it appears that the most important soil factor is the relative ability of the superficial layers to retain water; i.e. *the controlling soil condition is one of drainage.*

The author then discusses a hypothetical origin of the societies as the glacial period ceased and vegetation followed the retreating glaciers northwards; thus he thinks the Pine-Heath group, which to-day reaches farthest north, reached well toward the glacier forest during the ice age. After

these, probably, crept in the Oaks and Sassafras. Then the Hickories, Maples, and Beeches followed suit.

In the general conclusions, the author shows that physiography determines vegetation, but more specially it is the nature of the soil. The proof that local differences in vegetation depend upon soil factors is corroborated by the present investigations. These factors are the *chemical* and *physical* natures, but these depend upon the presence of water; hence he concludes that *the decisive factor in plant distribution over a small glaciated area is, in most cases, the moisture-retaining power of the soil.* *G. H.*

Uredineæ, Cultures of. By J. C. Arthur (*Bot. Gaz.* xxxv. No. 1, p. 10).—During the season of 1902, 123 collections of materials were employed. Of these 327 plant cultures were attempted, of 43 species of rusts, and 102 "hosts" were used. Full details are given of the experiments and results in each case.—*G. H.*

Vascular Plants, Stelar System of. By J. C. Schoute (*Die Stelar-Theorie, Proefschrift*, Groningen, Dec. 1902); Rev. in. *Bot. Gaz.* xxxv. No. 2, p. 144, by E. C. Jeffrey.—In examining the stem-apex and root-apex in a number of angiosperms, Schoute comes to the conclusion that the merismatic layers of Hanstein, the dermatogen, the periblem, and the plerome do not correspond at all accurately to the division of the tissues of the vascular plants into epidermis, cortex, and central cylinder.

With regard to the presence of the endodermis, it is a very constant feature of the stem of monocotyledons, being present in eighteen out of nineteen families. In dicotyledons it was present in 99 out of 169 families. The central cylinder of all vascular plants is the same or monostelic.—*G. H.*

Vegetables, Cultivation of. By George Coote (*U.S.A. Exp. Stn. Oregon, Bull.* n. 74; February 1903).—A bulletin written with a view to the private kitchen garden and the interested amateur.

It begins with an account of a method of growing Onions originally introduced into England by Worlidge in the seventeenth century and now being revived in America; that is, by starting in heat and transplanting into prepared beds; and further gives directions for the outdoor sowing of Onions and of their growth for "sets."

It also gives cultural directions for Peas, Beans of all sorts, Vegetable Marrows, Broccoli, and Cauliflower, and advice upon the choice of varieties.—*M. L. H.*

Vegetables for the Garden. By F. Wm. Rane (*U.S.A. Exp. Stn. New Hampshire, Bull.* No. 99, 3/1903; illustrated).—This bulletin was prepared in answer to numerous inquiries as to the two or three best varieties of vegetables for general use.

As a list of recommended varieties it is only intended to apply to New Hampshire, and is based upon the accumulated experience of several years.

Besides the usual vegetables, there are descriptions of Sweet Corn, Musk-melons, Water-melons, Peppers, Pumpkins, Squash, and Swedes or 'Rutabaga.'—*C. H. C.*

Vegetables, Garden (*U.S.A. Exp. Stn. Oklahoma, Bull.* No. 56, 12/1902).—A short summary of the methods of planting and cultivating the usual garden vegetables, with the names of such varieties as have been found valuable in Oklahoma.

Full directions are given for the cultivation of the Tomato as an open-air crop, for it is considered the most important vegetable grown in the farm garden, the season being a long one and the canned fruit being available in winter.

Single-stem training as practised in England is not recommended, on account of the extra labour required and the weaker quality of fruit obtained. A list of forty-four varieties is given, of which twelve are recommended.

Twenty-six varieties of Onions are given in a table, with the yield per acre, date of gathering, colour, and percentage as to keeping qualities. Of these, the six best varieties are described in detail.

Lettuce can only be grown successfully in the spring, with occasionally a crop in the autumn. There are many varieties, but the Curly-leaf Lettuces 'Grand Rapids,' 'Early Curled Silesian,' &c. are better adapted to the climate than the Head Lettuce, of which 'Paris White Cos,' 'Early Prize Head,' 'Silver Ball,' and 'New York' are the best.

Beans are divided into two classes, Bush and Pole Beans, of which the former are more commonly grown, as they do not require such a long season as the latter.

Peas are divided into "smooth" and "wrinkled," the former being the hardier and separated from the latter by two or three weeks.—*C. H. C.*

Vegetables, Sowing of. By A. Nasier (*Bull. R. Soc. Tosc. Ort.* 2, p. 50; February 1903).—In cold countries sowing should take place in April or early in May; but under glass much earlier, viz. from March 20 to middle of June. In places of moderate temperature the majority of the sowings take place in March. The seeds of vegetables are greatly subject to enemies. One of the first of these is the gardener himself who sows too early, and thus exposes his seeds to all the inclemencies of early spring weather. But an earlier sowing can be effected by mixing the seed with sand in a pot, keeping the whole moist, and from time to time re-mixing the seeds; and on the former showing signs of germination they should be planted out in the open. Other atmospheric enemies of seeds are excess of heat, drought, and violent winds. The worst enemies are slugs, snails, earthworms, mice, &c. The sowing should always be done far from anything that is likely to harbour these enemies, such as hedges, palings, grass, &c. As soon as seedlings begin to appear above ground the whole ground should be completely covered with soot, so as to ward off the noxious creatures above mentioned, while at the same time enriching the soil. Powdered lime is good for slugs, spread on the ground in early morning or evening.

To purify the seeds, it is recommended to bathe them in a solution of sulphate of copper of 1 per cent. strength; they should be well stirred in this liquid for half an hour, and afterwards removed and spread out to dry. They are then mixed with chalk-dust in the proportion of one kilogram of the latter to 50 kg. of seeds. A writer in the 'Revue d'Horticulture

pratique' states that seeds treated in this way germinated more quickly and more regularly, and gave rise to more vigorous plants, than those raised from seed not so treated, which plants were also freer from the attacks of vermin.

It is not advisable to make sowings with seeds which have passed the average period of their germinative power. A list is then given of 36 vegetables, with the average germinative period of each.—*W. C. W.*

Vine, Moth of the, To destroy. By J. Perraud (*Comp. Rend.* June 13, 1903).—The moth called *Tortrix Pilleriana* is said to be, after the Phylloxera, the most destructive of insects to the Vine in France. The following method of destroying the larva of this insect, which is concealed under the bark of the Vine during the winter, may possibly prove to be of value in connection with the destruction of other insect pests met with in this country.

After pruning, and while the buds are yet dormant, the entire plant is covered with a dome-shaped vessel made of zinc or galvanised iron. Crushed sulphur contained in a cup is ignited and placed under the dome, the latter being well pressed into the ground to prevent leakage of the gas produced by the burning sulphur. Half an ounce of sulphur is the amount required to use with a dome three feet high and two feet diameter. The cover should be removed after the sulphur has been burning for ten minutes. Times to avoid in carrying out the above measures are when the temperature is below zero, or immediately after rain.—*G. M.*

Vines, Large-leaved (*Garden*, No. 1636, p. 209; 28/3/03).—Apart from the different members of the genus *Vitis* that are grown solely for the sake of their fruits, there are numerous others remarkable for their handsome leafage, combined in some cases at least with edible berries. Regarded solely from an ornamental standpoint, their merits are by no means sufficiently recognised, for all are beautiful, and may with advantage be grown in different ways. The large-leaved forms are seen to a very great advantage in clothing an arch or pergola, or in rambling over neighbouring trees, while nearly all the species form delightful wall plants, and failing these positions each plant may be fastened to a stake, and spurred back annually, so as to consist of gracefully disposed bushes, which are very attractive throughout the summer, and doubly so in the autumn, when the foliage of many of them becomes very richly coloured.—*E. T. C.*

Vintage treated by Diffusion (*Dep. Agr. Victoria, Bull.* n. 2).—A translation of Pierre Andrieu's scientific and practical treatise on wine-making by an improved method of abstracting it, with tables of cost and illustrations of machinery.—*C. H. H.*

Violas. By D. B. Crane (*Gard. Mag.* n. 2577, p. 192; 21/3/03).—A selected list of the finest Violas, with a description of each, together with cultural notes.—*W. G.*

Wall Garden Making. By F. W. Meyer (*Garden*, No. 1635, p. 193; 21/3/03). The writer here deals with retaining-walls: that is, walls meant to keep up a high bank of soil, or to support a terrace.

E. T. C.

Ground Water. By W. P. Headden (*U.S.A. Exp. Stn. Colorado, Bull.* 72; August 1902).—A careful investigation of the surface water as regards its level and chemical qualities, with several tables of analyses. The writer concludes that the question of alkalisation resolves itself into one of drainage for that State.—*E. A. B.*

Weather, How to Foretell frosty. By A. H. Bell. (*Gard. Mag.* n. 2568, p. 37; 17/1/03).—He would be a bold writer indeed who would attempt to formulate rules that would be in any way reliable for forecasting any kind of weather in the capricious climate of these islands.

The writer of this article is careful not to commit himself to any rash assertions on the point, but he nevertheless gives some useful hints, the result evidently of close observations. Gardeners as a class are weather-wise by instinct, having generally from their youth intuitively studied the weather, though in most cases their deductions are acquired more from the observance of natural phenomena than by the aid of scientific instruments, as the barometer and hygrometer. As weather forms such an important factor in gardening, every young gardener should study meteorology, and perhaps after reading this article he may be induced to probe more deeply into the subject.—*W. G.*

Welwitschia mirabilis (*Journ. Hort.* Jan. 8, 1903, p. 38).—An engraving and description of this remarkable vegetable production of tropical South Africa, which has never been seen alive in England. A specimen may be seen at Kew in No. 1 Museum.—*C. W. D.*

Wendland, Hermann (*Gartenflora*, Heft 5, p. 122; March 1903).—No German horticulturist and botanist was more respected in this country than the veteran Herr Wendland, who died at Herrenhausen, near Hanover, in January last, in the seventy-eighth year of his age. The news of his death, although not unexpected, was received with profound regret by all who had had the pleasure of knowing him. Dr. Wittmack tells us that Hermann Wendland was born on October 11, 1825. At that time his grandfather, Johann Christoph Wendland, was superintendent of the Royal Gardens at Herrenhausen, and was in due course succeeded in that capacity by his son Heinrich Ludolph, the father of Hermann. All three were not only practical gardeners of the first order, but also accomplished botanists. After leaving school, Hermann learned gardening under his father from 1841 to 1844. He then removed to Göttingen to study botany, and afterwards to the Botanic Garden at Berlin. Thence he passed to the Imperial Garden at Schönbrunn. After making botanical excursions to the Tyrol and Northern Italy, he came to England in 1848 and entered the Royal Gardens at Kew, where he remained nearly two years. In after-life and up to within a few years of his death, he visited the Royal Gardens almost annually, spending several days amongst the Palms, Orchids, and other collections; and on its formatiou he became a member of the Kew Guild, in the Journal of which for 1900 his portrait forms the frontispiece. In 1850 he returned to Herrenhausen. Six years later, at the request and cost of King George of Hanover, he undertook a botanical mission to

Central America, and between November 1856 and September 1857 he visited parts of British Honduras, Guatemala, and Costa Rica. The most important result of the mission was the enriching of the gardens of Europe with many beautiful plants previously unknown, belonging chiefly to the Orchid, Aroid, and Palm families, the last named being a speciality of his. Among the best known and most appreciated of his introductions, *Anthurium Scherzerianum* indisputably takes a prominent place. Two years after his return to Europe, he received an appointment in the Berggarten at Herrenhausen, and in 1863, on the death of his father, he succeeded to the directorate, which he retained till his decease. Under his direction the Palm House in the Berggarten became one of the most famous in Europe, and he was looked up to both by botanists and horticulturists as one of the best authorities on Palms, a subject on which he published several valuable treatises. The collection of Orchids and stove plants in the Berggarten was also among the most extensive and best cultivated in Europe.—*A. H. K.*

Willows, New Asiatic. By E. Wolf (*Engl. Bot. Jahrb.* xxxiii. 1903, pp. 275–9; 24/4/1903).—The author describes seven new species from various localities in Central Asia.—*A. B. R.*

Woolly Aphis or American Blight. By Walter W. Froggart, F.L.S. (*Agr. Gaz. N.S.W.* pp. 18–25; January 1903).—An article dealing with this familiar Apple-pest. It is well known under both the above names, though several American entomologists have protested against their country being credited with being its native home, and claim that the term "American blight" is a misleading name, as it was known in Europe long before it was noticed in America. It was first recorded from Europe in 1787, and in the early part of the following century spread over France, Germany, and Belgium. Fitch states that nurserymen informed him in 1848 that it was prevalent in Virginia and Pennsylvania. It appears, at any rate, to have been introduced into England by way of America, for Sir Joseph Banks traced it, in 1789, to a London nursery, whose owner had imported Apple trees from America, but it is not improbable that it was previously taken to America from Europe, and imported into England *via* that country. The writer gives details of the manner in which the pest attacks the different parts of the tree, and refers to the practical application of producing blight-resisting stocks, which is due to the experiments made in 1868–1870 by Messrs. T. Lang & Co., the Victorian nurserymen. Then follow observations of the life-history of this pest, made by eminent entomologists in America, Europe, and Australia. The article concludes with notes on various experiments that have been carried out to combat the pest.—*H. G. C.*

Woolly Aphis at the Roots. By Prof. L. R. Taft (*Proc. Am. Pom. Soc.* 1901, p. 14). To destroy this pest, work in large amounts of wood ashes or tobacco dust among the roots.—*C. H. H.*

Yucca filamentosa, Development of the Macrosporangium. By H. S. Reed, University of Michigan (*Bot. Gaz.* xxxv. No. 3, p. 209).—

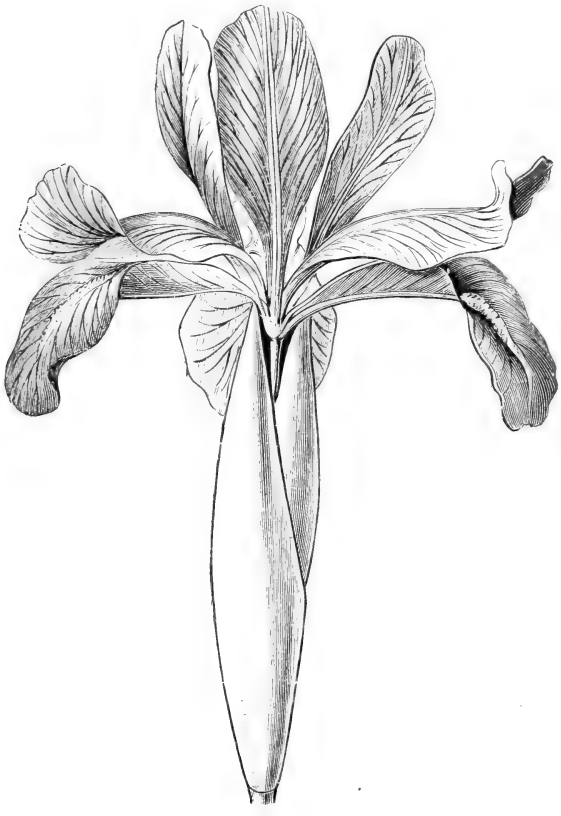
This short paper contains a description of the formation of the embryo-sac in preparation for fertilisation, with five figures.—*G. H.*

Zamia, Embryology of. By J. M. Coulter and C. J. Chamberlain (*Bot. Gaz.* xxxv. No. 3, p. 184, plates vi.–viii.).—The authors describe first the ventral canal cell and egg-cell. No wall is formed between them, and in no case was the former found to be cut off, and it soon disorganises. Their observations on the fertilisation stages confirm those of Webber. After it, there is a period of free nuclear divisions in the proembryo. These were counted to the 256-nucleate stage.

Then follows the description, with figures, of the differentiation of the suspensor and embryos.

A series of figures shows the gradual reduction in the number of free nuclei as follows: *Ginkgo*, *Cycas*, and *Zamia* have 256; *Taxus*, 32; *Podocarpus*, 16; *Thuya*, 8; *Pinus*, 4; *Ephedra*, 2; and *Gnetum* has no free nuclear division at all, thus reaching the condition of the embryogeny of angiosperms, in which the first division of the nucleus of the egg is accompanied by the formation of the wall.

The paper concludes with a list of works cited.—*G. H.*



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Local Societies subscribing £1 1s. per annum are entitled to—

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4.—To purchase at cost price Silver and Bronze Medals, Cards for Commendation, &c.

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The Secretary of the R.H.S. will also at any time be pleased to assist the Secretary of any affiliated Society by introducing them to Horticulturists or Specialists, able and willing to deliver Lectures on interesting subjects before Meetings of their Local Societies, or to act as Judges at Shows, &c., &c.

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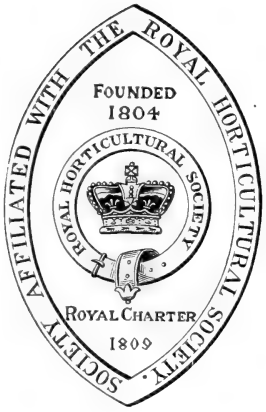

FIG. 1.

A wish having been expressed by some of the societies which are affiliated to the Royal Horticultural Society that they may be provided with a distinctive badge as the outward symbol of their affiliation, the Council have caused one to be prepared (fig. 1), which may be used by Affiliated Societies, on letter paper, schedules, &c., as they may think fit.

A printing block of this Badge will be presented to every Affiliated Society on application to the Secretary, and on signing an undertaking to return the same if the affiliation should for any reason be ended.

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Signed _____

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The Council have further struck an entirely new Medal (fig. 2) to meet the constant requirements of Affiliated Societies. It can be obtained in Gold, Silver Gilt, Silver and Bronze, and is reserved for the use of Affiliated Societies only.

FIG. 2.

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PARTS III. AND IV.

PESTS OF THE VINERY AND STOVE.

By M. C. COOKE, M.A., LL.D., A.L.S., F.R.H.S., V.M.H.

THE two sections of this communication treat of the fungoid diseases (1) of the Vine, and (2) of other plants cultivated in the hothouse. The pests which flourish at this high temperature seldom cause any trouble under other circumstances; but the close, heated, and moist atmosphere of the stove is especially favourable to the development of fungus parasites, and great care should be taken to recognise their earliest appearance, and hold them in check.

VINE LEAF-SPOT.

Septoria Badhami (Berk.), Pl. XIII. fig. 2.

This is not a common parasite, although we met with it several times about twenty years ago.

It was first recognised in 1853, forming little brownish spots on the leaves, upon which were seated a few of the dotlike conceptacles, which occur in clusters on either side of the leaf. On one occasion we found the spots to be wholly marginal, becoming confluent around the greater portion of the leaf. The conidia, or sporules, are elongated or somewhat club-shaped (35–50 μ long), with a few minute granules, and they appear to be rarely, if ever, septate.

Sacc. Syll. iii. 2581; *Cooke, Hdbk.* No. 1309; *Berk. & Br., Ann. N.H., No.* 748, t. 15, f. 9; *Thüm. Pilz. Wein.* p. 180.

SMALL VINE LEAF-SPOT.

Phyllosticta Badhami (Cooke), Pl. XIII. fig. 1.

Not less than fifteen other kinds of leaf-spots have been described as occurring on living vine-leaves, in addition to nine species of anthracnose.

This is a formidable list, but only one other has occurred in Britain, which answered in external appearance to the above description of *Septoria Badhami*, with the distinction that the conidia, or sporules, were minute ($6–7 \times 2\,\mu$); and, as we issued specimens of it under that name, we have since called it *Phyllosticta Badhami*. (*Journ. R.H.S.* 1878, p. 93.)

The other described species of Vine leaf-spot may be briefly enumerated here, as one or other of them may occur at any time.

Italian leaf-spot, *Phoma Negriana* (Thüm.), on living vine-leaves in Italy, has sporules $5–7 \times 3–3\frac{1}{2}\,\mu$.

Mildew leaf-spot, *Phoma succedanea* (Pass.), on vine-leaves in company with the mildew, has occurred in Italy with sporules $5 \times 2\frac{1}{2}\,\mu$.

American mildew leaf-spot, *Phoma ampelogena* (Sacc.), has been found in the United States to follow the American mildew on vine-leaves. Sporules $4 \times 3\,\mu$.

Vine leaf-spot, *Phyllosticta vitis* (Sacc.), found in Italy on living vine-leaves, with sporules $6 \times 3\,\mu$.

Labrusca leaf-spot, *Phyllosticta Labruscæ* (Thüm.), is an American species, which attacks the leaves of the Labrusca grape. The sporules are large, $9–11 \times 6–7\,\mu$, on small brown spots.

Italian Vine leaf-spot, *Phyllosticta viticola* (Sacc.), appears to be confined to living vine-leaves in Italy. The sporules are $5 \times 2\frac{1}{2}\,\mu$.

Léveillé's leaf-spot, *Phyllosticta Leveillei* (Cooke in *Journ. R.H.S.* 1878, p. 92), was described by Léveillé (in *Ann. Sci. Nat. Bot.* 1846, v. p. 279) and specimen preserved in Berkeley Herbarium, with sporules about $10\,\mu$ long. Known hitherto only in France.

Carolina vine-spot, *Phyllosticta viticola* (B. & C.), forms large spots on the leaves of *Vitis vulpina* in Carolina. Sporules $8–9 \times 4\,\mu$.

Ellis's Labrusca leaf-spot, *Ascochyta Ellisii* (Thüm.), on leaves of *Vitis Labrusca*, has bicellular sporules $6–8 \times 5–6\,\mu$.

Saccardo's leaf-spot, *Ascochyta ampelina* (Sacc.), on vine-leaves in Italy. Sporules two-celled, $10 \times 3\,\mu$.

Curtis's Vine leaf-spot, *Sacidium viticola* (Cooke, *Journ. R.H.S.* 1878, p. 92). Specimens from North America were distributed under the name of *Septoria viticola*. Sporules globose, $10\,\mu$.

Texas melanose, *Septoria ampelina* (B. & C.), on leaves of *Vitis vulpina*, known in Texas and S. Carolina, with sporules 30–50 μ long.

Small vine leaf-spot, *Septoria vineæ* (Pass.), has occurred in Italy, with sporules $12–18 \times 1\frac{1}{2}\,\mu$.

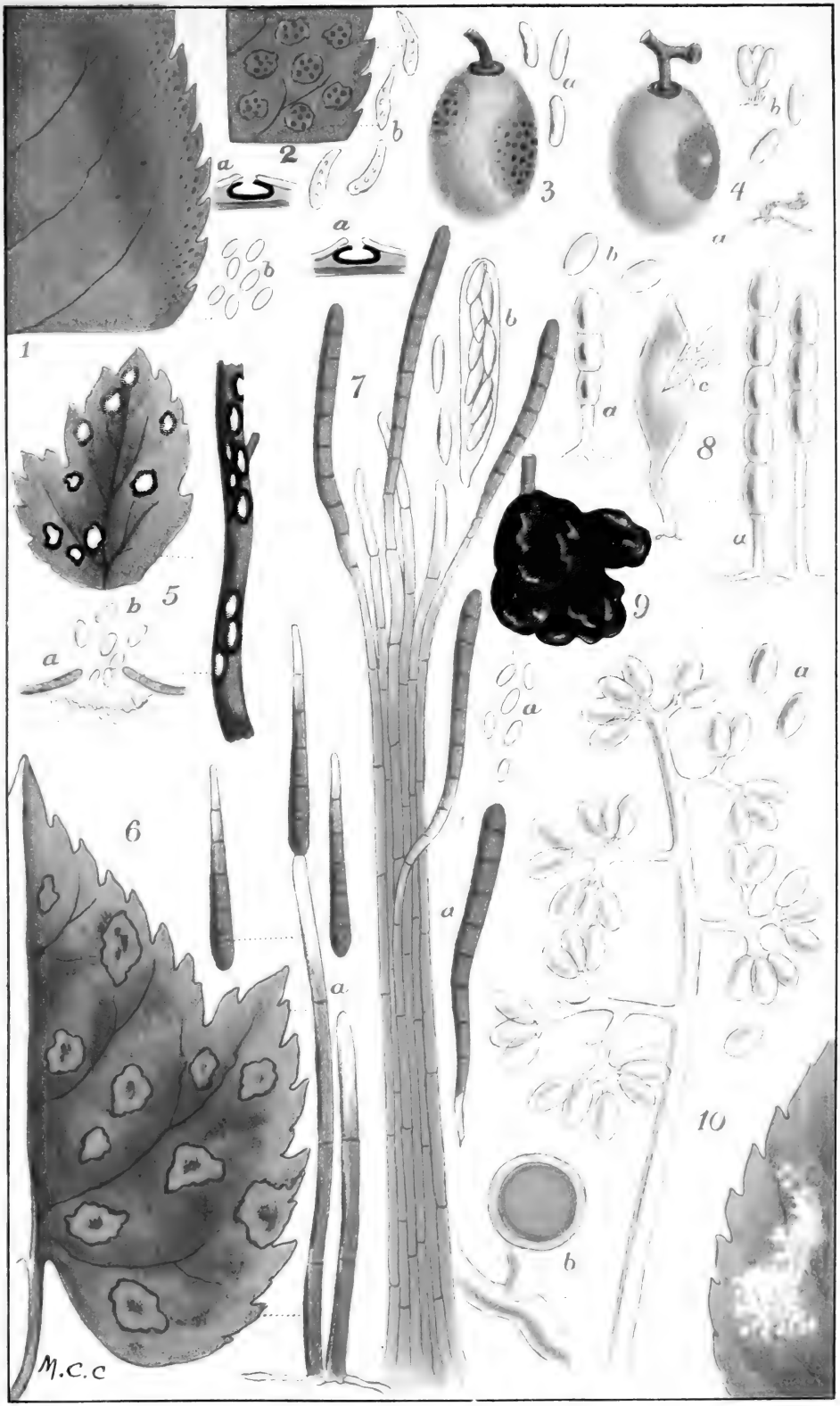
Sorokin's vine-spot, *Sphaceloma ampelinum* (Sorok.), is a Russian species but little known.

Grape Red Spot.

Gloeosporium rufomaculans (Berk.), Pl. XIII. fig. 3.

This spot was first recognised on grapes in 1854, and since that time it has fortunately occurred but rarely, especially as it is one of the kind known as anthracnose, and they are virulent diseases to deal with.

It forms a rounded spot of a sienna brown colour on the fruit,



PESTS—VINERY.

preserving constantly a definite outline. This spot separates readily from the subjacent pulp, in consequence of a copious crop of mycelium, the threads of which form the radii of a circle. The surface is rough with little raised orbicular reddish perithecia, or conceptacles, for there are no true perithecia, which are arranged in circles. The conidia are produced within the conceptacles or cells, and are oblong, without any division as yet observed, but constricted in the middle, and colourless (15–20 μ long). In age the false perithecia fall away, leaving a little aperture, the border of which is often stained black.

We have assumed this to be a *Glœosporium*, most certainly not *Ascochyta*, as first described, but we have not been fortunate enough to meet with it. It seems to be distinct from *Glœosporium uvicola* on grapes, but may be a form of *Glœosporium fructigenum*, which is said to occur on grapes as well as on apples.

Gard. Chron. 1854, p. 676; *Cooke, Hdbk.* No. 1358.

Australian anthracnose, *Glœosporium bicolor* (McAlp.), is the Apple-rot of Australia.

Grape Rot.

Glœosporium uvicola (Berk.), Pl. XIII. fig. 4.

There is some confusion in the records of this species, which has also been called *Glœosporium lœticolor*, but the proper host of that species is the Peach and Nectarine.

The spots are always of a pale orange, with an almost white spot in the middle. The tendrils of spores, or conidia, are similar in colour, and the conidia are larger than in the species upon Peaches (25 μ long). Fortunately it is a very rare species, and is not likely to cause much annoyance.

Berk., Gard. Chron. 1854, p. 676; Sept. 9, 1871, p. 1162.

Grape Anthracnose.

Glœosporium ampelophagum (Pass.), Pl. XIII. fig. 5.

This attacks Grape Vines in Italy and the United States, but until recently there has been no record of it in Britain. It attacks all the green parts, and internally exhibits very little mycelium; the pustules are without definite receptacles, and the conidia are produced on short stalks within definite cells; when mature they escape by rupture of the cuticle, and lie like a crust on the surface until dissolved by moisture ($5–6 \times 2\frac{1}{2}$ μ), when they float away to infect other parts. (Fig. 76.)

Gard. Chron. July 8, 1893, fig. 10; *Mass. Pl. Dis.* p. 279; *Sacc. Syll.* iii. 3755; *Thüm. Pilz. Wein.* p. 9 t. 3, f. 24; *Thüm. Pock. d. Wein.* (1880); *Sacc. Syll.* iii. 3755; *Tubeuf, Dis.* p. 484.

White rot of Grapes, *Coniothyrium diplodiella* (Speg.), occurs on the fruit, leaves, and rarely on twigs. It is uncertain whether it is truly a parasite. The coloured sporules are $7–11 \times 5\frac{1}{2}$ μ. This pest has recently

been investigated in Hungary by Istvanffi, and the results published in 'Annales de l'Instit. Ampélologique Roy. Hongrois,' ii. 1902, with 24 coloured plates, in which it is claimed to be a destructive parasite.

Squirt Berry, *Phoma tuberculata* (McAlp.), is an Australian species.

Grape Hendersonia, *Hendersonia tenuipes* (McAlp.), occurs on ripe grapes in Australia, but we doubt its parasitism, and also whether it may

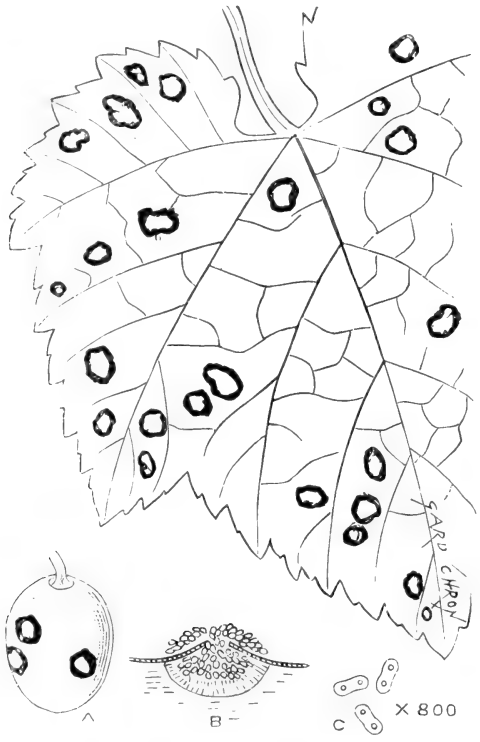


Fig. 76.—Anthracnose of the Vine. (*Gardeners' Chronicle.*)

not rather be a *Pestalozzia*, with delicate cilia not observed. It need cause no alarm in Europe.

Vine Leaf-spot Mould.

Cercospora viticola (Sacc.), Pl. XIII. fig. 6.

Massee says simply that it forms "brown spots on vine-leaves, and is most abundant during a damp season. Most abundant on the lower shaded leaves." Still we are in doubt whether he records it as British, and although we have seen foreign specimens, we have had none reputed to be indigenous.

The spots occur on both sides of the leaves, and are somewhat circular or irregular (2–10 mm.), becoming ochraceous, not distinctly marginate; threads on the under surface in tufts (50–200 × 4–5 μ), septate, ochre.

Conidia elongated, attenuated upwards, three- to four-septate (50–70 × 7–8μ), with a tinge of olive.

This is recorded for France, Germany, Portugal, Austria, and Italy, but must be quite distinct from *Isariopsis clavispora*, with which it has been confounded.

Sacc. Syll iv. 2200; *Mass. Pl. Dis.* pp. 319, 439.

Another species (*Cercospora Rössleri*), with shorter, obtuser, and more cylindrical conidia, is recorded on living vine-leaves for France, Portugal, Austria, and Italy (50–60 × 7 μ).

A species called *Cercospora sessilis* (Sorok.) is recorded from Russia.

Vine Leaf-tuft Mould.

Isariopsis clavispora (B. & C.), Pl. XIII. fig. 7.

This appears to be entirely an American species, but authors have confounded it with *Cercospora viticola*, and may do so again. We are not aware that it has been found on any other living leaves than those of *Vitis Labrusca*, and was first described by Berkeley.

The spots are brown, and mostly irregular. The compacted hyphæ are closely united in the lower portion, but become loosened and flexuous near the apex. The conidia are narrowly clavate, round at the apex, and multiseptate (as many as 7–9), hyaline and attenuated downwards, but brownish above (100 × 5–6 μ), each cell sometimes including a small guttule.

Careful examination will convince anyone that the conidia are attached by the thin extremity, and that they can hardly be regarded as a topsy-turvy condition of *Cercospora viticola*.

Sacc. Syll. iv. 2998; *Berk. & Curt., Grevillea*, iii. p. 100, No. 619; *Thüm. Pilz. Wein.* 177, t. 5, f. 7 (bad).

Other black moulds, of which many have been named in connection with the Vine, appear to be saprophytes, with the exception, perhaps, of *Fumago vagans*, which has a wide range of hosts, and may soon be disposed of, if it ventures to appear in a well-ordered vinery.

English Vine Disease.

Oidium Tuckeri (Berk.), Pl. XIII. fig. 8.

The ordinary English Vine disease was first observed in 1845 at Margate by a gardener, Edward Tucker, and it is known to this day as *Oidium Tuckeri*. In 1853 it appeared in Spain, and a year later in Portugal. It was first observed in Madeira in 1851, and was not long in spreading through the Continent of Europe.

The disease is too well known to need description. When the shoots are struck they become spotted with dark grey or rust colour; the leaves also become spotted, and covered with a cottony substance of fine filaments, as seen under the microscope. The grapes are covered with what appears to be a white powder, like lime, a little darkened with brown.

The mould, like other species of *Oidium*, has a creeping mycelium, which supports erect fertile threads, and these latter become differentiated into chains of colourless spores or conidia.

Some writers are of opinion that this disease is the same as the "powdery mildew" of the United States, the full development of which is known under the name of *Uncinula spiralis*; but as the receptacles, or the *Erysiphe* condition, have never been found in Europe, it is still a doubtful point. It is more than probable that the *Oidium Tuckeri*, as known to us, is an imperfect fungus of which the full development would naturally be a very close associate of *Uncinula spiralis*, if not really the same species.

As an epiphyte, the application of sulphur has been the only successful remedy, or sulphur in combination with lime.

Gard. Chron. May 15, 1886; 1847, p. 779; 1878, p. 74. *Journ. R.H.S.* 1878, p. 68. *Thüm. Pilz. Wein.* p. 1, t. 3, f. 1.

Powdery Mildew of Vine.

Uncinula spiralis (B. & C.), Pl. XIV. fig. 13.

American botanists are generally satisfied that this Vine disease of theirs is a fruitful development of the English Vine disease, which we only know, in the conidial form, as *Oidium Tuckeri*, for which reason, therefore, it is entitled to some notice here.

It forms white or greyish patches on the surface of the leaves, young shoots, and fruit. This is composed of the interwoven threads of the mycelium, from which afterwards arise short erect branches, the upper portion of which becomes converted into a chain of conidia, the final one, which is the oldest, falling away when mature, giving to the white patches a still more powdery appearance.

Towards the end of the summer, the globose conceptacles make their appearance amongst the mycelium, at first yellow, afterwards dark brown, attached at the base by delicate threads. Encircling the base, a series of spreading, straight, simple appendages radiate around the conceptacles, in number from ten to twenty, the tips of which are hooked or spirally twisted, and the lower part, next the conceptacles, coloured. The asci or sacs, within the conceptacles, enclose from four to six elliptical sporidia (20×8–$10\ \mu$).

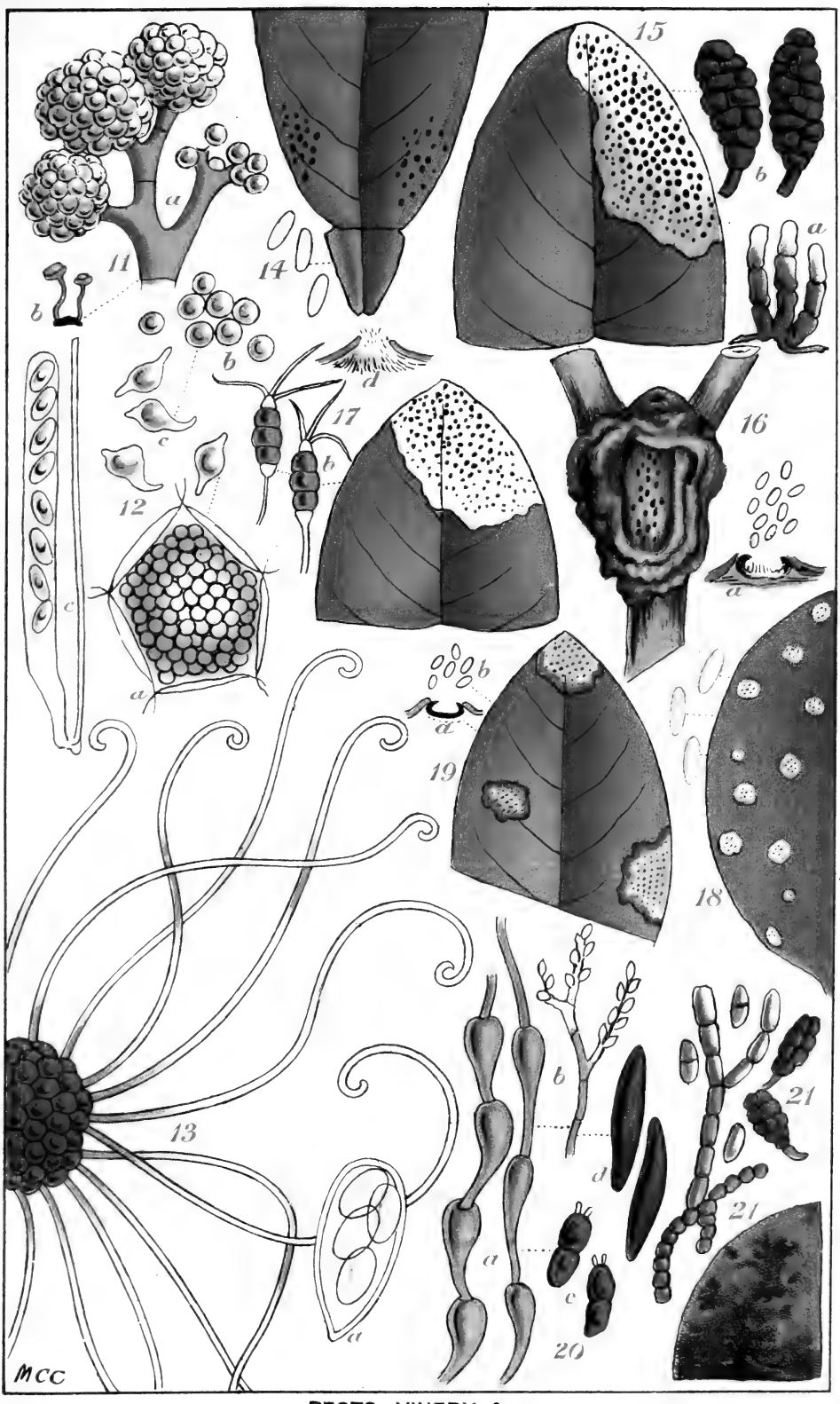
Journ. R.H.S. 1878, p. 68; *Thüm. Pilz. Wein.* p. 183; *Grevillea*, iv. 159; *Gard. Chron.* 1878, p. 74; *Mass. Pl. Dis.* pp. 93, 360, fig. 14; *Tubeuf, Dis.* p. 176.

In the United States another species of the same genus (*Uncinula subfusca*) attacks the living leaves of *Vitis Labrusca*.

Australian Vine Mildew.

Erysiphe vitigera (C. & M.)

This is the Vine mildew which in Australia corresponds to the powdery mildew of the United States, and to our own *Oidium Tuckeri*. In its early manifestations, and the conidial stage, it might be taken for *Oidium*



PESTS—VINERY, &c.

Tuckeri, and probably was so accepted before the discovery of the perfect fruit.

The first stage is the creeping mycelium and white mould, which covers the leaves, wholly or in patches, and this is followed by the presence, amongst the mycelium, of the little globose conceptacles, attached at the base, and furnished with a circle of appendages or flexuous threads, as in other species of *Erysiphe*, such as the one upon the Garden Pea, but less distinct and more interwoven with the mycelium. The receptacles contain four pear-shaped sacs or asci, each of which contains two sporidia ($18 \times 9\ \mu$), which are elliptical and colourless.

It was first made known and described in 1887.

The same remedies are recommended as have been applied in the case of the English Vine mildew, and doubtless the persistent application of sulphur will bring its reward.

Grevillea, xv. 98; *Sacc. Syll.* x. 1571.

Black Rot of Grapes.

Guignardia Bidwellii (Viala), Pl. XIII. fig. 9.

Doubtless one of the most destructive of our American Vine pests, which manifests itself in variable forms, found its way into Europe in 1885 with imported vines.

Young shoots and leaves are first attacked, under the form of small brownish blotches. A fortnight later the fruit shows symptoms of disease by the appearance of small blackish spots; afterwards the fruit turns black, shrivels, and becomes hard. At this stage the surface of the patches is seen to be studded with little black points, indicating what are termed the *pycnidia* form of the disease, or the summer fruits. These receptacles contain innumerable minute bodies, or stylospores, which are produced in the interior, and when mature ooze out through a pore at the apex (7–8 μ long). This is the condition which was first known, and was then called *Phoma uvicola*. The stylospores, after their escape, are carried about by moisture over the surface of healthy grapes, where they germinate at once, enter the tissues, form a diseased spot, and thus distribute the disease.

Later on other forms of summer fruit supervene, until the final or highest form of fruit appears on the diseased grapes lying on the ground during the winter. In this stage the sporidia are produced in cylindrical cells, or asci, and come to maturity in the spring. They are almost elliptical, without division, and colourless ($12–17 \times 4\frac{1}{2}–5\ \mu$).

In the United States spraying with Bordeaux mixture is much relied upon.

Gard. Chron. January 26, 1895, p. 101, fig. 13; *Mass. Pl. Dis.* p. 105; *Thüm. Pilz. Wein.* p. 156, f. 11; *Tubeuf, Dis.* p. 216.

Vine Sclerotinia.

Sclerotinia Fuckeliana (De Bary), Pl. XIV. fig. 11.

This Vine pest appears also under two or three forms, the earliest being that of a mould, representing the conidia, and not uncommon on

other plants as well as the Vine. In days when it was regarded as a complete or perfect fungus, it was called *Botrytis cinerea*, and that name is found to be sometimes convenient now.

The conidia form appears in tufts of a greyish colour, sometimes in large patches. The stems or threads are stout, erect, dingy-olive, somewhat branched in the upper portion, the tip of each branch bearing a somewhat globose tuft or cluster of broadly elliptical conidia (8–9 × 6 μ).

The mycelium of the mould traversing the tissues of the host becomes compacted into numerous small black sclerotia, which pass a period of rest and afterwards produce again the conidial fruit, or the cuplike form.

The little fleshy cups, or *Sclerotinia*, resemble a very miniature wineglass, with a long slender stem, the cups not more than one tenth of an inch across, but the stem possibly more than half an inch long. The inner membrane of the cup consists of cylindrical asci, or cells, packed closely side by side, each containing right sporidia, which are the perfect fruit. The sporidia are elliptical, colourless (10–11 × 6–7 μ).

Spraying with dilute Bordeaux mixture destroys the conidia. Leaves and other débris likely to contain the sclerotia should be collected and burnt.

Sacc. Syll. viii. 799; *Mass. Pl. Dis.* p. 148, fig. 31; *Thüm. Pilz. Wein.* pp. 195, 197; *McAlpine, Dep. Agri. Vict.* p. 29.

American Downy Mildew.

Plasmopara viticola (B. & C.), Pl. XIII. fig. 10.

The American mildew is not of the same character as the English Vine mildew, inasmuch as whilst the latter is a surface mould in the first instance, the former is an innate rot-mould, like the potato and onion diseases. Not only is it North American in its origin, but it has already found its way over to Europe and into the British Isles.

This mould attacks all the green parts of the Vine. The mycelium traverses the tissue of the leaves before there is any external manifestation. In time erect threads arise from this mycelium and find their way in tufts through the stomata into the external air, and produce conidia.

From five to eight of these fertile threads will issue through a breathing pore, and form a tuft of white mould. Hence the under surface of the leaves soon exhibits downy patches of the mould, and it came to be called "downy mildew." The upper portion of the threads is branched in a peculiar manner, and the conidia are borne on little points at the tips of the branches. The primary branches alternate; the secondary branches three- to four-furcate, the ultimate branchlets pointed, straight, short, usually four, bearing the ovoid conidia (from 8 × 12 μ to 7 × 30 μ).

In time the conidia evolve from their contents five or six active zoospores, armed with two cilia, by means of which they move about.

The other mode of reproduction is by resting-spores, which are subglobose (30–35 μ diam.), with a brownish smooth or slightly wrinkled coat.

The most effectual remedy yet devised is spraying the Vines with a solution of sulphate of copper and lime.

Tubeuf, Dis. p. 128; *Sacc. Syll.* vii. 806; *Mass. Pl. Dis.* 69, fig. 9, p. 354; *Gard. Chron.* January 2, 1894, July 21, 1894; *Farlow, Bull. Buss. Inst.* 1876, p. 415; *Journ. R.H.S.* 1878, p. 73; *Thüm. Pilz Wein.* p. 166 t. 1, f. 5.

Vine Root Clubbing.

Plasmodiophora vitis, Pl. XIV. fig. 12.

One of the latest importations of Vine diseases is that known as "Vine clubbing," which does not differ greatly from the clubbing in Turnips. Probably it is quite true that some of our Vine-growers have known it for years, but did not regard it in any serious light.

The Vine roots in question are swollen into large somewhat globose nodules, as large as the fist, the surface being rough or warted, with obtuse projections, and when cut the cellular interior is found to contain a mucilaginous substance, not unlike the plasmodium of some species of Myxomycete.

In all essentials the new parasite conforms to the Turnip club-root, or "fingers and toes." In its earlier stages a section of the distorted root will exhibit the ordinary cells enlarged to very many times their original dimensions, and filled with a slimy mucilaginous fluid, of a yellowish colour, capable of being drawn out into slimy strings, but with no trace of the ordinary fungus threads, or mycelium, which usually accompanies fungoid parasites. Later on, towards autumn and winter, the cells present a somewhat different appearance, being no longer filled with the structureless mucilage, but differentiated into a host of nearly spherical bodies with a distinct cell-wall, and possessing all the characteristics of conidia, or fungus spores. These bodies are produced in enormous quantities, and of an extremely minute size, but without colour.

By patient research and continued investigation, it may be possible to trace the germination and development of these conidia, which, it may be presumed, do not differ materially from those of the Turnip club-root.

In the slime fungi (*Myxomycetes*) the spores or conidia on germination give origin to one, two, or more naked cells which possess the power of movement, due to the protrusion of pseudopodia, or the presence of a cilium; these are known as swarm-cells. They possess a nucleus, multiply by bipartition, and eventually coalesce to form a plasmodium in this manner. After the production of numerous swarm spores by repeated bipartition, little groups are formed, by the close approach of two or more of these bodies; these groups often disperse again, but eventually the components of a group coalesce, and lose their individuality. This coalescence results in the formation of a small plasmodium which possesses the power of attracting surrounding free swarm-cells, which at once coalesce and augment the bulk of the plasmodium. This power of aggregation and formation of a plasmodium originated the name of *Plasmodiophora*, or "plasmodium-bearer," for the present genus, the slimy mucilaginous stage being the plasmodium condition of the parasite.

By a series of gradations it has been demonstrated that each atom of protoplasm creeps out of its envelope and becomes a zoospore, with a kind of hairlike tail. It may be conjectured how these creeping bodies, when

released from an old clubbing, remain in the soil, progress to other and neighbouring roots, and thus continue to perpetuate and diffuse the species. Each club root is therefore a centre from which the disease may spread. It is scarcely probable that any of the numerous fungicides will be of any avail to dislodge the parasite when once it has obtained possession. The only feasible remedy is to extirpate by burning every atom of infected roots, and not to plant again on the same spot without removing the whole of the soil, and replacing it by fresh and unpolluted earth. This may seem to be a drastic measure, but with such a foe only measures which are thorough can be effective.

Whether a Californian Vine disease, which is attributed to *Plasmodiophora californica*, is the same as the present species, we are unable to determine.

Gard. Chron. June 17, 1893; *Mass. Pl. Dis.* p. 338; *Mass., Ann. Bot.* ix. p. 421, pl.; *Tubeuf, Dis.* p. 528.

Another Vine-root parasite was described some years ago under the name of *Rösslera hypogæa*, which was found on Vine roots after they were really dead, not only in Austria, but in this country. They were little rounded fungi, like the head and upper portion of a large pin, but unfortunately, when they were submitted to that eminent lichenologist, the late Rev. W. Leighton, he pronounced them to be a well-known lichen called *Coniocybe pallida*.

Gard. Chron. Dec. 22, 1888, fig. 105; *Thüm. Pilz. Wein.* p. 210, t. 4, f. 9.

White Root-rot.

Dematophora necatrix (Hartig), Pl. XIV. fig. 20.

This root disease, which affects the Vine as well as other plants, was originally known by the above name, representing the imperfect condition in which it is usually found.

The mycelium spreads rapidly underground, and when it comes in contact with the rootlets of a plant it kills them, and gradually works its way upwards into the larger portions of the root. Sometimes, after travelling upwards, it bursts through the bark at the base of the trunk in a white woolly mass.

During its progress minute sclerotia are formed, which originate dark-coloured, rigid, bristly conidiophores bearing numerous conidia at their tips.

Another kind of fructification is sometimes found on decaying roots in the form of pycnidia, or conceptacles containing stylospores.

The highest or ascigerous form of fructification is more rare, and consists of large black perithecia which include asci and sporidia, and are surrounded by the bristly conidiophores. In this condition it has been characterised under the name of *Rosellinia necatrix* (Prill. & Del.).

Spraying is out of the question in such a case, and no cure can be hoped for when the mycelium is once established. If the disease appears, the affected plants should be isolated by trenching around them.

Hartig & Somer. Dis. p. 82, with figs.; *Viala, Mon.* with 5 plates; *Mass. Pl. Dis.* p. 118, fig. 21.

Discoloured Vine Leaves.

Discoloured Vine leaves are continually turning up without furnishing any clue to the cause. These are mostly discoloured in large bright blotches, which are sometimes yellow, as in some forms of the "Californian Vine disease;" or dark red, as in the "Sicilian Folletage;" or red, brown, and yellow, as in the Italian "Mal Nero." They appear to give evidence of some form of organic disease, and yet to evade all microscopical scrutiny, and after many years to remain as great a mystery as ever, and consequently without the suggestion of a remedy.

U.S.A. Report Dep. Agri. 1892.

CONSERVATORY PARASITES.

Separate from the fungi which affect garden plants there are a few that are troublesome in the stove and conservatory, and these could not be excluded from the present enumeration. In this connection the list might have been much extended, but the persons interested would be necessarily limited, as compared with those who confine themselves to outdoor culture.

Sooty Mould of Orange.

Fumago vagans (Pers.), Pl. XIV. fig. 21.

This black mould is familiar enough, as it occurs on the foliage of numerous trees in this country, and especially such as are subject to honeydew. It forms black patches on the leaves, to such an extent as to form a crust, but in this condition it is simply an imperfect fungus, and may develop into a species of *Capnodium* or *Meliola*, as the case may be.

The creeping mycelium is branching, and closely adnate to the matrix, sometimes confluent and forming cellular ganglia, or torulose, like a string of beads, constituting an effused thinly membranaceous stratum, which is apt to flake off when dry, and resembling a coating of soot. Short fertile branches arise from this mycelium, which are more or less branched; conidia at the tips of the branches, often forming short chains, sometimes one-celled, usually two-celled, and sometimes three-celled (5–15 μ long), dark brown.

It is found throughout Europe and North America, and in parts of Asia, but it is scarcely probable that we shall be troubled with the advanced stages in this country, whether *Capnodium*, *Meliola*, or any of their kindred.

Sacc. Syll. iv. 2618; *Journ. R.H.S.* iv. 251; *U.S.A. Dep. Agri. Bull.* 8, pl. vii.; *Mass. Pl. Dis.* p. 101, f. 17.

Specking of Citrus fruits, in Australia, has been attributed to a mould fungus *Penicillium digitatum*, causing a loss of from 2 to 50 per cent. on fruit shipped during the season.

Journ. R.H.S. xxviii. p. 243.

Orange Sooty Blotch.

Several kinds of 'sooty blotch' are recorded, but it is doubtful if any of them are British.

The Italian sooty blotch, *Meliola Penzigii* (Sacc. 'Fungi Italici,' figs. 1132–1135), is found in South Europe, and of this *Capnodium citri* (Desm.) is possibly a form.

Sicilian blotch, *Meliola citri* (B. & P.), is found on Orange leaves in Sicily.

Australian blotch, *Capnodium citricola* (McAlp.), occurs on leaves of Orange and Lemon in Australia. (*Mass. Pl. Dis.* p. 103.)

Lemon and Orange Scab.

Cladosporium citri (Mass.).

This mould is developed on the leaves and fruit of Orange and Lemon in a manner analogous to the scab on Apples (*Fusicladium*), and is very injurious to Orange trees in Florida and Louisiana. (*Mass. Pl. Dis.* p. 310.)

Another and similar mould attacks Orange leaves in Italy. This is *Cladosporium elegans* (Penz.).

The 'foot-rot' of Orange and Lemon trees, in South Europe and the United States, is attributed to *Fusarium limonis* (Briosi).

Orange Anthracnose.

Glœosporium Hendersonii (B. & Br.). Pl. XIV. fig. 14.

This parasite of cultivated Oranges was described by Berkeley some years ago, but does not appear to be common. It occurs on the under surface of the leaves, and the pustules are scattered without forming any definite spots.

The conidia, which are produced in the pustules, are oblong ($12\frac{1}{2}$–15 μ long), and the mass, when extruded through the ruptured cuticle, is slightly coloured.

B. & Br. Ann. N. H. No. 1702; *Sacc. Syll.* iii. 3673; *Grevillea*, vi. 126.

There are seven or eight other species of Anthracnose which attack Orange leaves, especially in the South of Europe, but they are not recorded as British, and leaf-spots, of several genera, almost too numerous to mention, but our interest in Orange culture is comparatively small.

One Italian leaf-spot, *Sphærella Gibelliana* (Pass.), develops asci and sporidia on living Orange leaves.

Orange-leaf Anthracnose.

Several species of Anthracnose have been recorded as attacking the foliage of Orange and Lemon trees in conservatories.

Glœosporium Hesperidearum forms large bleached spots on the leaves, on which the pustules are gregarious and numerous. The conidia are

cylindrical, straight, rounded at the ends, without guttules (14–18 × 5–6½ μ). This has been detected only in Italy.

Another Italian species is *Glœosporium depressum*, occurring also on dry spots on fading leaves, with the pustules scattered on the under surface. The conidia are elongated elliptical (7–8½ × 2½–4 μ), produced upon rather long fasciculate basidia (20–24 μ long).

The Belgian species has large irregular greyish-brown spots, without definite margin, on which are seated the small whitish pustules. The conidia are ejected in flesh-coloured masses, and very minute (3 μ long). It is called *Glœosporium aurantiorum*. Another Italian species (found also in France), *Glœosporium intermedium*, has the pustules pointlike, black, without forming definite spots, with long straight conidia, rounded at the ends (14–18 × 4–6 μ).

Yet another occurs on Orange as well as on *Hoya* leaves (*Glœosporium macropus*) without forming any definite spots, the long conidia (18–21 × 4–6 μ) produced on very long basidia (48–60 μ long). Any of these may be found in our conservatories at any time.

The Olive is not sufficiently cultivated in this country to render its parasites of much interest.

Fig Mould.

Botrytis cinerea (Pers.).

This mould, long regarded as a saprophyte, has been found destructive to ripe figs, covering them with a dense felted mass of grey hyphæ, and bearing a profusion of oval conidia. It appears to be the same species as causes the Lily disease. For other Fig parasites see "Pests of Orchard and Fruit Garden."

Journ. R.H.S. xxviii. p. xxxix and p. 29.

A black mould, *Cercospora Bolleana* (Thüm.), has occurred on Fig leaves, and is believed to have appeared recently in Britain.

Camellia Blotch.

Pestalozzia Guepini (Desm.), Pl. XIV. fig. 17.

This disease is far from uncommon on the leaves of Camellia under cultivation, and is so widely extended that it attacks the Tea plants in the Tea gardens of India.

It causes unsightly large blotches on the living leaves, which are mostly of a rounded form, but sometimes irregular through confluence of the blotches. They are bleached and of a silvery white colour on the upper surface, with a strongly defined outline, and sprinkled with the black dots which indicate the pustules. There are no true perithecia, the sporules being produced in small cavities in the substance of the leaf, the surrounding cells modified and discoloured so as to form a false receptacle.

The sporules are of a remarkable kind, peculiar to the genus. In outline they are somewhat spindle-shaped, being attenuated towards each end (20 μ long), with three or four transverse divisions, the apical cell colourless

and conical, bearing a tuft of three or four long colourless hairs, which form a crest. The bottom cell is also colourless, and attenuated into a long hyaline stem equal in length to that of the sporule. The intermediate cells are coloured brown, and become at length rather opaque. When mature the sporules are discharged through the rupture of the cuticle.

It is found throughout Europe and in North America, also on leaves of *Rhododendron*, Orange, *Hoya*, *Magnolia*, *Smilax*, *Lagerstrœmia*, and Almond, but typically on Camellia.

The only check is to collect and burn all diseased leaves.

Sacc. Syll. iii. 4146; *Cooke, Hdbk.* No. 1401 with fig. 183.

Camellia Scar.

Coryneum Camelliæ (Mass.).

It must be confessed that some little mystery surrounds this parasite, which has only been detected once upon living Camellia leaves. The large blotched spots exactly resemble those which are caused in the Camellia blotch, but in that species the conidia are crowned at the apex with three or four long and spreading hairs, whilst in the present species the spores are similar in form and size, but *without* any crest of hairs. This may seem to be but a slight distinction, but it is the principal difference between *Pestalozzia* and *Coryneum*. It may be possible that this is an abnormal form of *Pestalozzia Guepini* in which the hairs are suppressed.

The pustules are numerous on the whitened spots, splitting the cuticle in a linear, triangular, or stellate manner, so as to allow of the escape of the conidia. The latter are lanceolate ($30 \times 10\,\mu$), with from two to four coloured cells in the middle, and a small triangular uncoloured apical and basal cell, supported at first on slender pedicels of the same length as the conidia.

The same remarks as to prevention apply as in the case of *Pestalozzia*, if this is not really, as we suspect, the same species.

Grevillea, xx. p. 8 (1891).

Camellia Black Mould.

Macrosporium Camelliæ (C. & M.), Pl. XIV. fig. 15.

Externally, and to the naked eye, this form of spotting the living leaves of *Camellia* so much resembles that caused by *Pestalozzia Guepini* that even an experienced eye can scarcely detect the difference until the microscope is employed. The silvery-white spots on the upper surface are of the same size, usually half an inch, and there is a distinct brown margin.

The scattered dark points are small, but when magnified are found to consist of tufts of brown or pale olive threads piercing the cuticle. The threads are flexuous (30–40 μ long), with cross divisions. Mixed with these, or supported upon them, are the club-shaped conidia, with, at first, three cross divisions, but at length double that number, with longitudinal divisions, like a brick wall ($50–60 \times 15–25\,\mu$). Downwards these conidia are attenuated into the pale olive pedicel, the whole upper part of the conidium being of a little darker olive.

This may not be an injurious pest, as many of the species are saprophytic, and the possibility would suggest itself, whether this mould has not taken possession of a dead spot, caused by the *Pestalozzia*, and become established upon it. At any rate, conidia of *Pestalozzia* were sought diligently, and not a single one could be found.

Grevillea, xvii. 42 ; *Sacc. Syll.* x. 7837.

Gardenia Canker.

Pl. XIV. fig. 16.

Tumours are formed on the stems, at the base, just above the ground, or on branches near a fork, on *Gardenia* and also on *Camellia*. They resemble other cankers, and appear to be the result of local irritation. The bark around, which was at first, perhaps, a wound, swells, becomes corky, and of a rusty brown, covering a patch an inch or more long. When the centre of the tumour is bare, the woody tissue is seen to be dead, and occupied by black dots, which are the thin receptacles of an immersed *Phoma*, with minute narrowly elliptical conidia (7×2 μ). This is not the cause of canker, but a sequence. Sometimes several scars are confluent at the bottom of stems, and are swollen in a gouty manner by the corky transmutation of the surrounding cell.

Hoya Leaf-spot.

Phyllosticta Bolleana (Sacc.), Pl. XIV. fig. 19.

Forming spots on the living leaves of *Hoya carnosa*, which are bleached to a greyish white, with an irregular brown margin, forming a striking contrast to the bright green of the leaf. The receptacles are scattered over the spot like minute black dots to the naked eye, containing the small elliptical sporules, which are just tinged with grey ($4–5 \times 2–2\frac{1}{2}$ μ).

It is doubtful whether the minute fungi of this genus, which forms spots on living leaves, are to any considerable extent injurious to the plant. They may become so by disfiguring the foliage, especially if they spread themselves, but they are certainly incapable of inflicting such injury as that caused by the various kinds of Anthracnose. Their life-history is at present much involved in mystery.

Probably, should any of them prove troublesome, it would be well to submit the plants to treatment with one of the copper solutions.

Sacc. Syll. iii. 70 ; *Grevillea*, xiv. 39.

Another leaf-spot (*Septoria Hoyæ*) forms various white spots on Hoya-leaves, girt by a brownish ring, sporules threadlike ($20–25 \times 1–1\frac{1}{2}$ μ) or a little club-shaped. In botanic gardens in Italy.

Hoya Anthracnose.

Glœosporium affine (Sacc.), Pl. XIV. fig. 18.

This spot has recently made its appearance in hot-houses at Glasgow, and may soon travel southwards. It was previously known in Italy ;

it belongs to a genus which is eminently destructive, and includes many pests.

The spots on the leaves are variable, both as to size and form, becoming bleached or whitened, having little pustules on the surface. These pustules are scattered, and consist of small discoloured cells, without any true or distinct outer covering or receptacle, nestling beneath the blackened cuticle. The pustules appear chiefly on the upper surface. At length an irregular opening is made, and the conidia ooze out in the form of a tendril. They are cylindrically oblong, rounded at the ends, colourless, and spring at first from the cushionlike base of the pustule, borne on short delicate basidia. Conidia of moderate size for the genus (14–20 × 4–6 μ).

The parasite occurred on leaves of *Hoya* and on *Æschynanthus*. Apparently the same species has also occurred on leaves of Orchids at Glasgow.

We can only advise strict burning of all diseased leaves.

Sacc. Syll. iii. 3707; *Grevillea*, xix. 42.

Two other species of Anthracnose are recorded on *Hoya*, in Italy, under the names of *Glœosporium sphærelloides* and *Glœosporium macropus*.

Tea and Coffee Pests.

The fungoid pests of Tea and Coffee shrubs are not of much interest to the home horticulturist, although of considerable importance in the tropics, the Ceylon Coffee disease especially, *Hemileia vastatrix* (Berk.), having caused immense damage in the plantations, not only of Ceylon, but in Southern India, and in tropical South America. So also has the Coffee Leaf-rot, *Pellicularia Koleroga* (Cooke), in Southern India.

The Tea shrub is liable to the attacks of *Pestalozzia Guepini*, which is described above.

Gard. Chron. Oct. 25, 1879, fig. 87.

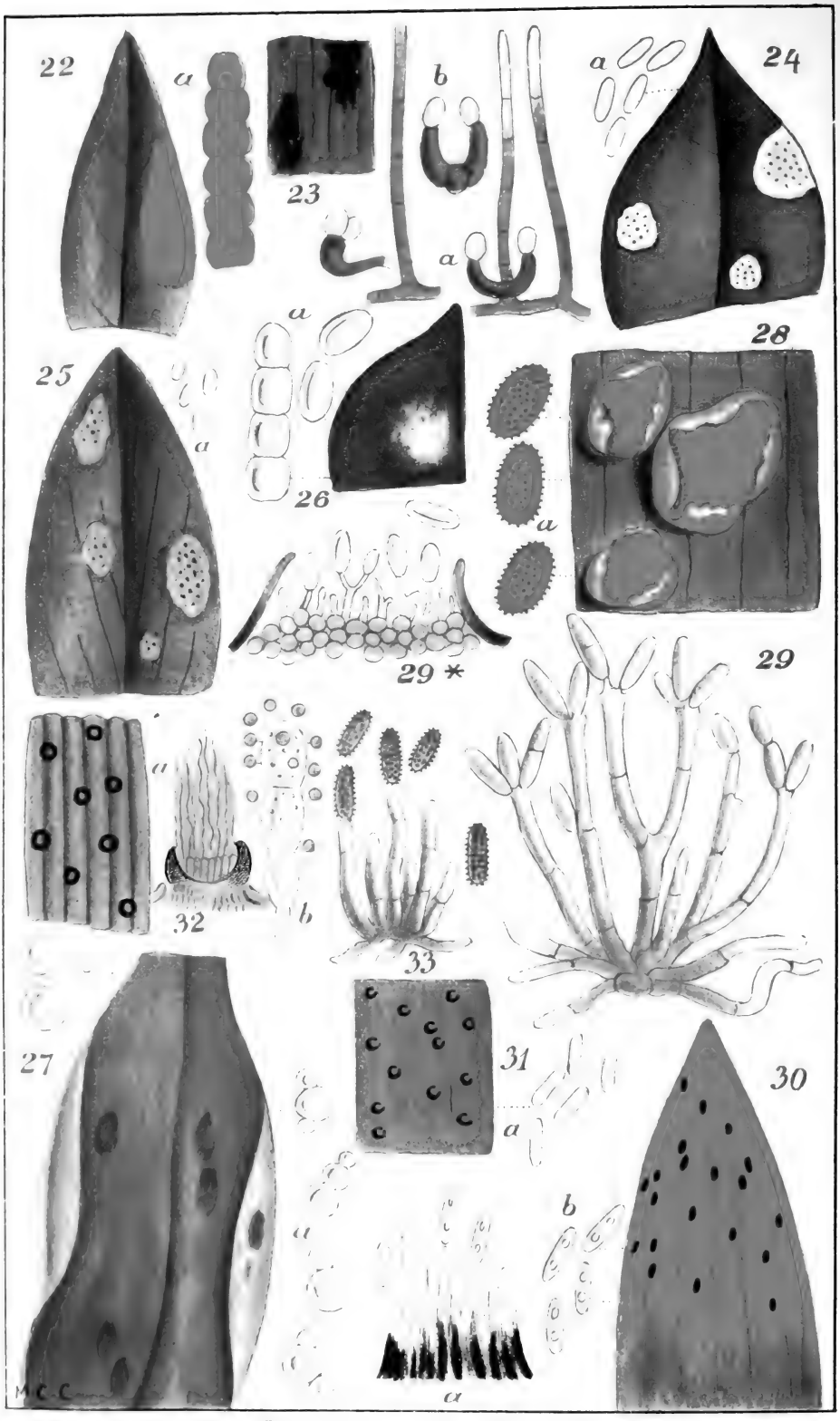
Azalea Leaf-dot.

Pestalozzia longiseta (Sacc.).

This species was first found in Italy on living leaves of a species of *Rubus*, but in this country it has been found on *Azalea* leaves. The spots are rufous, margined by a black line, on which are seated the point-like pustules, which are themselves black, covered some time by the cuticle. The conidia are almost fusiform, pointed towards each end (20 × 8 μ), divided by four transverse septa. The three central cells are coloured dark brown, the two extreme cells small and colourless. From the upper cell spring three very long hairlike processes (30–40 × 1 μ). The lower cell is attached to a slender hyaline pedicel.

Like Anthracnose, this is a deeply seated endophytal disease, and all that can be done is to prevent its spreading.

Sacc. Syll. iii. 4115; *Grevillea*, xv. p. 19.



PESTS OF CONSERVATORY.

Another leaf-spot, of an ordinary kind (*Septoria Azaleæ*), has been recorded in Italy, and is just of the kind that is likely to spread.

A rust on *Azalea* has been known in North America (*Uredo Azaleæ*) for very many years, but does not appear to have done much mischief.

Jasmin Chain Mould.

Chromosporium pactolinum (Cooke), Pl. XV. fig. 22.

First described under the name of *Oidium pactolinum*, when it was found on living leaves of *Jasminum Sambac*, forming a thin stratum, as if sprinkled with gold-dust or chrome powder. The threads, if any, were not to be detected, the powder consisting of the nearly globose conidia, attached to each other in chains of from six to ten cells. Whilst remaining attached, the ends of the conidia are flattened at the point of junction, but when free they acquire a globose form (10 μ diam.), with a thin hyaline membrane, but with granular golden-yellow cell-contents.

At present this has only been recorded in Britain, and is certainly epiphytal, probably not at all injurious to the plant; at any rate it is very curious.

Grevillea, xii. 98; *Sacc. Syll.* vi. p. 633, x. p. 511.

Two or three kinds of leaf-spot have been caused upon Jasmin-leaves by imperfect fungi, but none of these have been recorded as British.

Passion-flower Black Mould.

Zygosporium oscheoides (Mont.), Pl. XV. fig. 23.

This minute black mould was first discovered in Cuba, growing on dead leaves, and was only regarded as a saprophyte, but recently it has been recorded on leaves of *Passiflora quadrangularis*, seemingly under the impression that it was a parasite, and a new species, under the name of *Cladotrichum passifloræ* (Pim.).

The fertile threads are erect, septate (70 × 3 μ), sooty brown, inflated and paler at the apex, at the base emitting a semilunar sporophore. Conidia, oval or globose, produced singly or in pairs at the apex of the sporophores (5 μ diam. or 12 μ long).

The peculiarity is that the hyaline conidia are borne at the end of curved club-shaped branches, which is sufficient to identify the species.

This same mould has been found in Cuba and elsewhere on Screwpines and Palms.

Gard. Chron. Dec. 5, 1885, p. 724, fig. 164; *Sacc. Syll.* iv. 1591; *Corda, Icon.* vi.

Stephanotis Leaf-spot.

Phyllosticta Stephanotidis (Grove), Pl. XV. fig. 24.

This leaf-spot was detected on the leaves of *Stephanotis* in 1886, forming round or irregular spots, which are bleached or whitened and surrounded by a thin dark brown line. The receptacles appear on the upper surface, and are small, numerous, and scattered over the spots,

nestling beneath the cuticle, which is pierced by the small orifice of the receptacle. Conidia oblong, rounded at the ends (12–16 × 4–5 μ), and colourless.

No experiments were tried, but possibly dilute spraying might be advantageous.

Journ. Bot. 1886, p. 134 ; *Sacc. Syll.* x. 5049.

Dracæna Leaf-spot.

Phyllosticta draconis (B. & W.), Pl. XV. fig. 25.

The original occurrence of what appears to be the same pest was in Portugal, many years ago, on the leaves of *Dracæna Draco*, but the specimens then collected were immature and deficient in fruit; the external habits of the two appear to be the same.

The present specimens occurred on the leaves of *Dracæna terminalis* and *Dracæna Cooperi* in conservatories, and at present the species seems to be restricted in range and influence.

The spots occur on both surfaces of the leaves, are pallid and very irregular in form, with a distinct purple border. The little black points scattered over the spots indicate the minute spherical receptacles which are seated within the substance of the leaf, and are covered by the thin cuticle, through which they are scarcely visible to the naked eye.

The sporules are profuse, minute, elliptical, and quite colourless, escaping when mature by a pore at the apex of the receptacle (7 × 3 μ).

Generally the fading or sickly-looking leaves are those which are attacked.

Sacc. Syll. iii. 334 ; *Grevillea*, xix. p. 8.

Dracæna Anthracnose.

Glœosporium dracænicola (B. & Br.).

This species was first described by Berkeley and Broome under the name of *Myxosporium dracænicola* as a destructive pest on the leaves of *Dracæna*. The description is so imperfect that it would be difficult to identify, but it is said to be orange, and to have conidia which are ovate (9 × 6 μ).

At present it would appear to have been found in Britain upon cultivated *Dracæna*.

Berk. & Br., Ann. Nat. Hist. 1881 ; *Sacc. Syll.* iii. 3805.

No genuine fungoid disease has yet been detected in this country on the leaves of *Aspidistra*, although discoloured spots are not infrequent. One species, *Septoria transversalis* (Sacc.), is reported to occur in South Europe.

Caladium Mould.

Monilia pruinosa (C. & M.), Pl. XV. fig. 26.

This mould was first discovered on the fading leaves of a species of *Caladium*, but whether it was the cause of the fading was not ascertained.

It formed a broadly effused thin white stratum, as if the leaf was covered with hoar-frost; from the creeping mycelium arose the fertile threads, which were rather sparse and flexuous, elongated, and septate (10–12 μ diam.), branching irregularly. Conidia united in short chains, subglobose or oval (14–15 × 12 μ), colourless.

This has very much the appearance of an ordinary species of *Oidium*, of which the Vine mildew is a familiar type, and looks suspicious, as though it were capable of doing mischief in a conservatory.

Should it make its appearance we would advise spraying with diluted Bordeaux mixture.

Grevillea, xvi. 78; *Sacc. Syll.* x. 7081.

Several other pests on Aroids have been described from time to time, but they do not appear to have attacked any of the species cultivated in Britain.

Eucharis Disease.

Saccharomyces glutinis (Cohn.), Pl. XV. fig. 27.

This pest occurs on the leaves, petioles, and bulbs of *Eucharis subdentata* and upon *Hymenocallis adnata*, and caused some anxiety a few years ago. The examination was undertaken by Mr. W. B. Grove in 1886, and he discovered that the cause of all the mischief was a very simple little fungus allied to the yeast fungus and the microbes.

The cells of which the fungus is composed are round, oval, oblong, elliptical, or shortly cylindrical (5–11 × 4 μ), either single or united in twos, but seldom more together. The cell membrane and contents colourless when fresh, but when moistened again, after drying, with a faintly reddish central nucleus.

This is such a deeply seated endophyte that we doubt if the application of fungicides would have any beneficial effect.

Gard. Chron. Mar. 27, 1886, figs. 74–77; *Grove, Syn. Bact.* p. 63, f. 66; *Grevillea*, xiv. 132.

Orchid Disease.

Protomyces concomitans (Berk.).

Previous to 1882, for many years, imported Orchids were known to be liable to a kind of spot which baffled efforts to ascertain its cause. At length Berkeley believed that he had solved the mystery through a species of *Dendrobium*, the whole plant, and especially the leaves, of which were much spotted. Abundant mycelium, connected with globose pale umber bodies, immersed in the parenchyma was found, and to these was attached the above name. In some places the mycelium was beaded or moniliform. (Fig. 77.)

The species of *Protomyces* are very simple in their structure, mostly lying concealed in discoloured spots and of a destructive nature. It is often that their presence is only suspected, mycelium alone being found, until upon some fortunate occasion the sporelike bodies are met with.

It need scarcely be said that in this instance the evidence is incom-

plete, as the details are too meagre to determine whether this is really a species of *Protomyces*, and as the observations have not since been confirmed whether it is the true cause of spotting.

Gard. Chron. Sept. 23, 1882, fig. 63.

Orchid Rust.

Uredo Lynchii (Berk.), Pl. XV. fig. 28.

Our indigenous Orchids have long been known to be subject to the attacks of a bright orange *Uredo*, which is not at all uncommon, but there is no record of its having attacked Orchids under cultivation. For this purpose another and similar rust has made its appearance, and the golden rust which from time to time is found on the leaves of more than

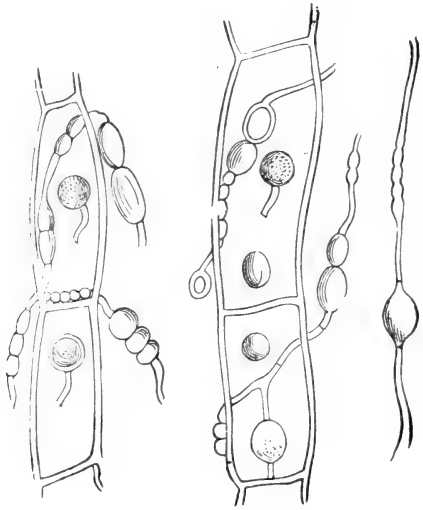


Fig. 77.—Protomyces concomitans. (*Gardeners' Chronicle.*)

one species of *Spiranthes* claims to be quite a different rust from that of wild Orchids.

The spots are small and scattered, but not numerous, sometimes not more than half a dozen pustules on a leaf. The uredospores are yellow and obovate, covered with minute spines (28–35 × 20–30 μ) and produced on short footstalks. It has made its appearance, more or less, every year in Orchid-houses, and as soon as it appears the leaf should be cut off and burnt. By such measures it has hitherto been kept in check where it has appeared.

Sacc. Syll. vii. 3069; *Gard. Chron.* Aug. 25, 1877; *Grevillea*, vi. 126; *Plowr. Br. Ured.* 259.

Orchid Leaf-spot.

Leptothyrium perniciosum (Berk.).

In the year 1865 Berkeley described a kind of spot on Orchids and the fungus producing it, with the above name, and this we are obliged to

retain, although evidently wrong, as it is not a *Leptothyrium* at all. He says : " It begins on the young leaves, causing a brownish ill-defined spot ; after a time this exhibits different shades of olivaceous brown, and the parenchyma of the leaf becomes quite pulpy and semi-putrescent. On the underside of the leaf little raised dots are seen, which are caused by the cysts of a fungus beneath. The parenchyma is more or less traversed by hyaline mycelium with jointed threads, and each cyst or perithecium, which is of a pale umber, is surrounded by a broad border of hyaline, perfectly colourless, jointed threads, the upper joints of which are more or less swollen.

" Sometimes the leaves pass rapidly into a state of decay, but occasionally the parenchyma dries up, the spots become bleached, but are surrounded by a dark border and studded with the concentrically arranged perithecia. In these I have detected spores, which are broader at one end than the other, and uniseptate. Occasionally the disease commences again in the same leaf, so that the incipient and old stages may be compared together."

These examples were found on the leaves of *Lycaste Skinneri* and on *Odontoglossum citrosmum*.

" The fungus is in all probability merely a condition of some more perfect form, to which the provisional name of *Leptothyrium perniciosum* may be given.

" Spots at first olivaceous brown, at length bleached ; perithecia at first scattered, at length somewhat concentric, depressed, surrounded by a fringe of hyaline articulated colourless threads. Spores with two nuclei, obovate oblong, sometimes at length uniseptate.

" It is not a good *Leptothyrium* ; on the thin leaves of *Lycaste* it looks much more like. In this case the spots are sometimes six inches long, and parallel to each other, following the direction of the nerves."

We have never seen this species, but insert it in the hope that some knowledge may be obtained. There are features which lead to the conclusion that it may be a *Glœosporium* or *Marsonia*, which is far more probable than *Leptothyrium*.

Journ. R.H.S. vol. i. *N. S.* 1866, p. 25.

Orchid Black Mould.

Cladosporium orchidearum (C. & M.), Pl. XV. fig. 29.

There need be no alarm amongst Orchid-growers respecting this new form of parasite which falls upon decaying leaves, since we are convinced that it only makes its appearance on dead or diseased tissue.

The threads are in tufts which seem to protrude through the stomata, and are short, here and there branched and septate, but slender and flexuous, and of a pale olive colour. The spores or conidia are borne at the tips of the branches, and are mostly elliptical, with a cross division in the centre forming two cells ($17–18 \times 5–6\ \mu$) of a pale olive colour. The conidia are very variable in this genus, both in size and form, some being found without a division and others with two or three, but in the present instance we have observed none with more than one division.

Gard. Chron. Oct. 11, 1890, fig. 82 ; *Sacc. Syll.* x. 7506.

Vanilla Anthracnose.

Glœosporium vanillæ (C. & M.).
Hainesia vanillæ (Mass.), Pl. XV. fig. 29.

The Vanilla disease described by G. Massee has evidently no connection with Bidgood's Anthracnose, nor has it, perhaps, much interest for the English cultivator, but concerns more intimately Vanilla-growing countries. This species has been found to develop into a higher condition systematically, where it is known as *Calospora vanillæ*, but its destructive stage is the Anthracnose.

It appears on the leaves of Vanilla in the Mauritius, Seychelles, and Reunion Islands, as well as New Granada. The pustules are small, on either surface, covered by the blackened cuticle. The conidia are elongated, elliptical, and colourless ($14–16 \times 6–7\ \mu$).

On account of some slight technical distinction, of very doubtful value, the name has recently been changed to *Hainesia vanillæ*, but the name is of very slight importance.

Sacc. Syll. x. 6815; *Grevillea*, xv. p. 18; *Kew Bulletin*, 1892, No. 65, plate; *Mass. Pl. Dis.* pp. 113, 368.

Bidgood's Orchid Anthracnose.

Glœosporium Bidgoodii (Cooke), Pl. XV. fig. 30.

This disease has only been determined during the latter part of the year (1901), although its effects have been recognised for the past six years. The leaves attacked have been those of *Odontoglossum*. The tips of the leaves become yellow, but the spots appear to start anywhere, and now the black shining pustules have been found upon the spots, which Mr. Bidgood has correctly indicated as those of a species of *Glœosporium*, but as he has not described it hitherto it is but courtesy to associate it with his name, as he devoted much time and energy to its investigation.

The pustules are rather large, and covered by the blackened cuticle, at length ruptured for the escape of the conidia. The stroma upon which the conidia are produced is also blackened, but the conidiophores become hyaline above, bearing the narrowly elliptic conidia ($18–20 \times 4\ \mu$), which have two nuclei. No direct evidence has yet been furnished that the conidia become uniseptate, although one of the microphotographs taken might give that impression.

Journ. R.H.S. xxvi. 1901, pp. cxxxix and cxli, vol. xxviii. p. 262; *Trans. Brit. Myc. Soc.* 1903, p. 15.

American Orchid Anthracnose.

Glœosporium cinctum (B. & C.), Pl. XV. fig. 31.

This species occurred on cultivated Orchids in Massachusetts, and was described by Berkeley. The pustules are minute and gregarious, covered and circled by the blackened epidermis, so as to appear like little black rings. The conidia are oblong and obtuse at both ends, sometimes

curved, granular within (10–15 × 2½–3 μ). The species of Orchid has not been recorded.

It is not clear that this species has been found in this country, since the suspicion that the species found on Orchids at Glasgow was the same is without good foundation, the size of the sporules being different, and, as far as can be ascertained, the pustules in the above species are not produced upon bleached spots.

Neither, again, can the more recent Orchid Anthracnose be referred to this species, which we have called here *Glœosporium Bidgoodii*, since the external appearance and fruiting appear to be different.

Sacc. Syll. iii. 3765 ; *Journ. R.H.S.* xxvi. 1902, p. 729, fig. 305.

Other Orchid Anthracnose.

As this seems the most fatal source of Orchid disease, we may enumerate the known species of Anthracnose found on Orchids.

Malagassy Orchid Anthracnose.

Glœosporium pallidum (Karst.).

This species was found on the leaves of Orchids from Madagascar cultivated in France. The pustules are pallid, and not blackened as is often the case, and the conidia oblong, straight, and obtuse at the ends (10–16 × 3–6 μ).

Sacc. Syll. x. 6816.

Mexican Orchid Anthracnose.

Glœosporium orchidearum (Karst.).

In this instance the pustules are covered with the blackened cuticle, which is split longitudinally to allow the conidia to escape. Perhaps the most distinctive feature is in the form of the conidia, which are elongated, fusiform, or unequal-sided (20–25 × 5–7 μ).

Sacc. Syll. x. 6817.

Oncidium Anthracnose.

Glœosporium Oncidii (Oud.).

This species occurred on the leaves of *Oncidium* in the Botanical Gardens at Amsterdam. In this case the pustules are round and brownish-grey, perforated in the centre for the escape of the conidia, which are oblong or pear-shaped (14–17 × 4½–6 μ) and are ejected in a rosy mass at the orifice of the pustule.

Sacc. Syll. xi. 3658.

Screw-pine Black Anthracnose.

Melanconium pandani (Lev.).

Screw Pines under cultivation are liable to attack from a fungus which settles itself irrespectively upon the trunk, aerial roots, and adventitious branches, where it forms small black pustules, which are sometimes so numerous as to blacken the parts attacked. The productive cells are

concealed beneath the cuticle, but there is no true perithecium or receptacle, and the conidia are formed upon a kind of cushion, or stroma, supported at first on rather long branched stalks. They are elliptical or oblong, either straight or slightly curved, often with two nuclei, but variable in size (5–9 × 3–4 μ), pale olive, oozing out, when mature, either in black tendrils or irregular inky masses.

This species was made known in 1845, but has not been much heard of since. It is allied to the species of Anthracnose, but with coloured conidia.

Another fungus, bearing the sporidia contained in asci (*Nectria pandani*), has also been found on Screw Pine, of which it has been suggested that the above is a condition, but we think that the suggestion is of very little value, as there is no precedent for such an association.

Ann. Sci. Nat. Bot. 1845, p. 66; *Mass. Pl. Dis.* pp. 293, 431; *Sacc. Syll.* iii. 3985.

Palm-leaf Pustule.

Graphiola phœnicis (Poit.), Pl. XV. fig. 32.

This peculiar kind of fungus is found on the living or fading fronds of Palms in conservatories, in Britain and most other parts of Europe, in North America, parts of South America, Ceylon, India, and Algeria.

The pustules appear like hard, black, superficial, round excrescences upon the leaves, being developed beneath the cuticle, but soon erumpent (1–1½ mm. diam.). They possess an outer horny coat, and a thinner inner coating, which is filled with fertile threads, and numerous rather small (3–6 μ) globose yellowish uredospores, with a hyaline membrane. When the spores are dispersed the threads remain for some time in a tuft within the remains of the black outer coat, looking scarcely like either a rust or a smut.

Sacc. Syll. vii. 1915; *Cooke, Hdbk.* No. 1637; *Tubeuf, Dis.* p. 326; *Cooke, Hdbk. Austr. Fungi*, t. 28, f. 260.

The black mould *Zygosporium oscheoides* (fig. 23) has also been found on Screw Pine and the foliage of palms in tropical countries.

Palm-leaf Black Mould.

Heterosporium minutulum (C. & M.), Pl. XV. fig. 33.

This mould is of the same nature as one which is very destructive to Carnations, and occurs on the leaves of Palms, in this instance on *Chamærops humilis*. It forms dark olive velvety patches of variable size and form, sometimes considerable in extent, with a creeping mycelium. The threads are mostly collected in tufts, and are rather short, flexuous, and sparingly septate, of a pale olive colour. Conidia with one or two septa, elliptical, rounded at the ends, but not constricted at the joints, pale olive (16–20 × 6–8 μ), and externally rough, as in other species of the genus.

This is also at present only recorded for Britain, but it belongs to such a persistent group of parasites that it will probably be heard of again.

Grevillea, xvi. 11; *Sacc. Syll.* x. 7767.

A small dotlike fungus, *Phoma Kentiæ* (Cooke), has been found flourishing on the dead tips of the fronds of *Kentia*, under cultivation, with sporules 8–10 × 4 μ. It is doubtless only a saprophyte. Other species, assumed to be parasitic, have been described as occurring on *Kentia* in Algeria, as *Plœospora Kentiæ* (Maubl.), *Ascochyta Kentiæ* (M.), and *Stagonospora Kentiæ* (Maubl.). All of them on living leaves. (*Bull. Soc. Mycol. de France*, xix. fasc. 3, p. 293.)

Bamboo Mould.

Oospora inæqualis (C. & M.).

This is a thinly effused white mould, found on the culms of growing bamboos, under certain conditions of weakness. It spreads broadly but thinly like a glaucous bloom, of a pale grey colour.

The conidia are unequal in size and form, from globose to elliptical, united together, end to end, in short curved and either simple or branched threads, colourless, and when globose 5 μ diam., attaining to double that length, with the same diameter.

The specific name has since been changed to *Oospora Cookei* by Saccardo on account of the prior adoption of *inæqualis*.

It is scarcely probable that it would resist moderate spraying.

Grevillea, xvi. p. 10; *Sacc. Syll.* x. 7057.

EXPLANATION OF PLATES XIII., XIV., XV.

Fig. 1.—*Phyllosticta Badhami*, Cooke.—*a*, section; *b*, sporules × 400.
2.—*Septoria Badhami*, Berk.—*a*, section; *b*, sporules × 400.
3.—*Glœosporium rufomaculans*, Berk.—With sporules × 400.
4.—*Glœosporium uvicola*, Berk.—*a*, pustule; *b*, sporules × 400.
5.—*Glœosporium ampelophagum*, Pass.—*a*, section with sporules × 400.
6.—*Cercospora viticola*, Sacc.—*a*, hyphæ with conidia × 400.
7.—*Isariopsis clavispora*, B. & C.—*a*, cluster of hyphæ with conidia × 400.
8.—*Oidium Tuckeri*, Berk.—*a*, conidia; *b*, free conidia; *c*, pycnidia.
9.—*Guignardia Bidwellii*, Viala.—*a*, conidia; *b*, ascus and sporidia × 400.
10.—*Plasmopara viticola*, B. & C.—*a*, hypha with conidia; *b*, resting-spore × 400.
11.—*Sclerotinia Fuckeliana*, DBy.—*a*, Botrytis form; *b*, Peziza; *c*, ascus and sporidia × 400.
12.—*Plasmodiophora vitis*.—*a*, cell with spores; *b*, spores; *c*, mobile spores.
13.—*Uncinula spiralis*, B. & C.—Perithecium with appendages; *a*, ascus and sporidia × 400.
14.—*Glœosporium Hendersonii*, B. & Br.—With sporules × 400,
15.—*Macrosporium Camelliæ*., C. & M.—*a*, hyphæ; *b*, conidia × 400.
16.—*Gardenia* canker.—*a*, section with sporules × 400.
17.—*Pestalozzia Guepini*, Desm.—*a*, section; *b*, conidia × 400.
18.—*Glœosporium affine*, Sacc.—*a*, with sporules × 400.
19.—*Phyllosticta Bolleana*, Sacc.—*a*, section with sporules × 400.
20.—*Dematophora necatrix*, Hart.—*a*, brown hyphæ; *b*, tip of conidiophore; *c*, stylospores; *d*, ascospores × 400.
21.—*Fumago vagans*, Pers.—Hyphæ with conidia × 400.
22.—*Chromosporium pactolinum*, Cooke.—*a*, chain of spores × 400.
23.—*Zygosporium oscheoides*, Mont.—*a*, *b*, hyphæ with conidia × 400.
24.—*Phyllosticta Stephanotidis*, Grove.—With sporules × 400.
25.—*Phyllosticta draconis*, B. & W.—With sporules × 400.
26.—*Monilia pruinosa*, C. & M.—With conidia × 400.
27.—*Saccharomyces glutinis*, Cohn.—With conidia × 400.
28.—*Uredo Lynchii*, Berk.—Enlarged sori, with uredospores × 400.
29*.—*Glœosporium vanillæ*, C. & M.—Section of pustule with sporules × 400.
30.—*Glœosporium Bidgoodii*, Cooke.—*a*, section of pustule; *b*, sporules × 400.
31.—*Glœosporium cinctum*, B. & C.—With sporules × 400.
32.—*Graphiola phœnicis*, Poit.—*a*, section; *b*, hypha and conidia × 400.
33.—*Heterosporium minutulum*, C. & M.—Hyphæ with conidia × 400.

JUDGING DAHLIAS, ESPECIALLY THOSE OF THE CACTUS SECTION.

By Chas. Geo. Wyatt, F.R.H.S.

In view of the greatly extended culture of the Dahlia, and especially of the Cactus Section, and of the increase, therefore, of the number of exhibitors of the flower, I think all must admit that the proper judging of them is a matter of great importance, for as exhibitors become more numerous the competition must of necessity be more and more keen, and the reason for an award well defined and explicable.

A person becomes enthusiastic in the culture of Dahlias, and if it continue, his enthusiasm is almost sure sooner or later to enlist him in the fighting army—the army of exhibitors—and such a one will very naturally ask, What are the special features about the flower, apart from the rather vague expression "beauty," which will gain favour in the eyes of the judges and tend to make the exhibitor also a prize-winner?

All exhibitors will agree with me that at present there is very little to guide one, and especially a beginner, in the selection of the flowers to show, and that very much of the merit of a Cactus Dahlia is left to the personal and individual taste of the judges; tastes which oftener than not are entirely unknown to the exhibitors; and one can quite imagine in a close competition an award being given to one or other of the stands in which some flowers, or some special features about them, which happen to be in favour with the judges, predominate. One judge may think size of chief importance, and there are many such; another will allow bright colour to influence his decision; another some other property. The award may be perfectly correct, but in the absence of any code for judging, a great weight is laid on the responsibility of the judges and a great deal of insecurity on the fate of the exhibitors.

This state of things and the keener competition we may reasonably expect as time goes on make it of the utmost importance that some well-defined code or set of rules be issued on the authority of the Royal Horticultural Society or by the National Dahlia Society, or, better still, by both combined, whereby an exhibitor may know exactly in what way his flowers will be judged, what properties in the flowers will give him the best chance of winning a prize, and what defects will lessen his chance of so doing.

And not only from an exhibitor's standpoint is this set of rules a necessity, but equally so from that of the judges, for they would materially assist him in giving an unbiassed decision, a decision uninfluenced by any individual taste; he would be able to point to the rules in question as his authority for the decision he gave, and exhibitors would be, or ought to be, fully cognisant of them.

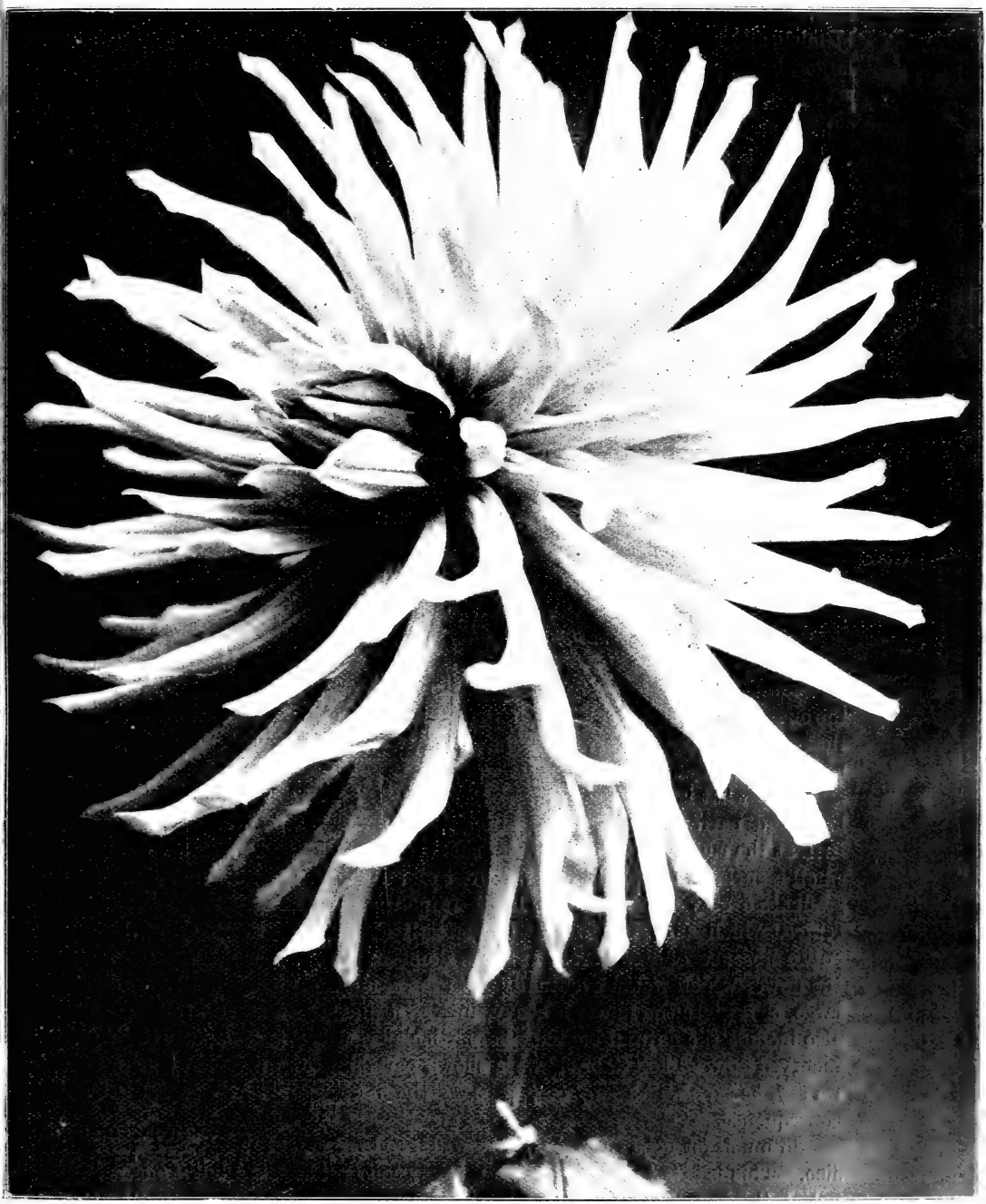


FIG. 78.—FLORENCE M. STREDWICK. PURE WHITE. (*Stredwick.*)

As an instance of the difficulty now confronting a judge let us suppose there are three stands of Cactus Dahlias. In one of them the flowers are all of medium size, all perfect in form and colour, without blemish, and nicely set up. In another stand the flowers are considerably larger, but not so good in form, and like those in the other stand are well set up. In another stand the flowers are large and good, but very badly set up. Now we have at present no authority, no instructions to guide us as to what order the awards here should take, and it is easy to conceive that one judge would decide in one way and another in another way; but with a given set of rules the judging of them would present no serious difficulty, and the decision would create no discontent.

Having now spoken of the difficulty, and I hope made it clear that there is a need for some code for judging Cactus Dahlias, some authoritative guide for the work, I proceed to offer a few suggestions which, if the societies think fit, might, when Dahlias are to be judged, with advantage supplement the general rules for judging which I believe are issued by the Royal Horticultural Society.

When competition is in any way keen it is generally admitted that the best means of judging is by points, allowing so many to each flower or set of flowers, as the case may be; and this is the only plan feasible, I think, in the case of the Dahlia. Now if we examine the good properties of a Dahlia as set up for exhibition, we shall find that all of them may be classed under four heads, namely, *form*, *size*, *colour*, and the *setting up*.

Although the first of these is perhaps the one which presents the greatest difficulty, good form, it must be granted, is decidedly the most important feature in any flower, be it a Dahlia, a Rose, or any other of the flowers which so frequently grace an exhibition table. Might it not be almost said that our very presence here to-day would seem to point to the encouragement of good form in the Dahlia? I would therefore suggest that to this very important feature the highest number of points be accorded.

As to what is good form in a Cactus Dahlia, I consider it should have long and narrow florets, either straight or incurved, and that they fold back at the edges towards the under side of the flower, so as to present as small a surface as possible to the front of the flower; the florets should graduate evenly and without a break from the outside right to the very centre, which should of course be perfectly closed. There should be an entire absence of flat florets, and the dome or central base, that part of the flower which would eventually form the seed-head, should not be over large, or it gives the flower a heavy, inelegant finish. Good form should also include the natural bent of the particular variety; for instance, if an incurved flower like 'Gabriel' were shown partaking of the form of, shall we say, 'J. W. Wilkinson,' or *vice versa*, the flower should lose points in consequence.

So much for good form. The second good property I mentioned was size. This is always admitted to be a very important feature; but it ought not, I think, to take precedence of good form, and if the flower be unnaturally large, coarse, and ungainly, it should not be accorded the full number of points for size. Full number should only be given to bold flowers of good size and texture and free from coarseness.

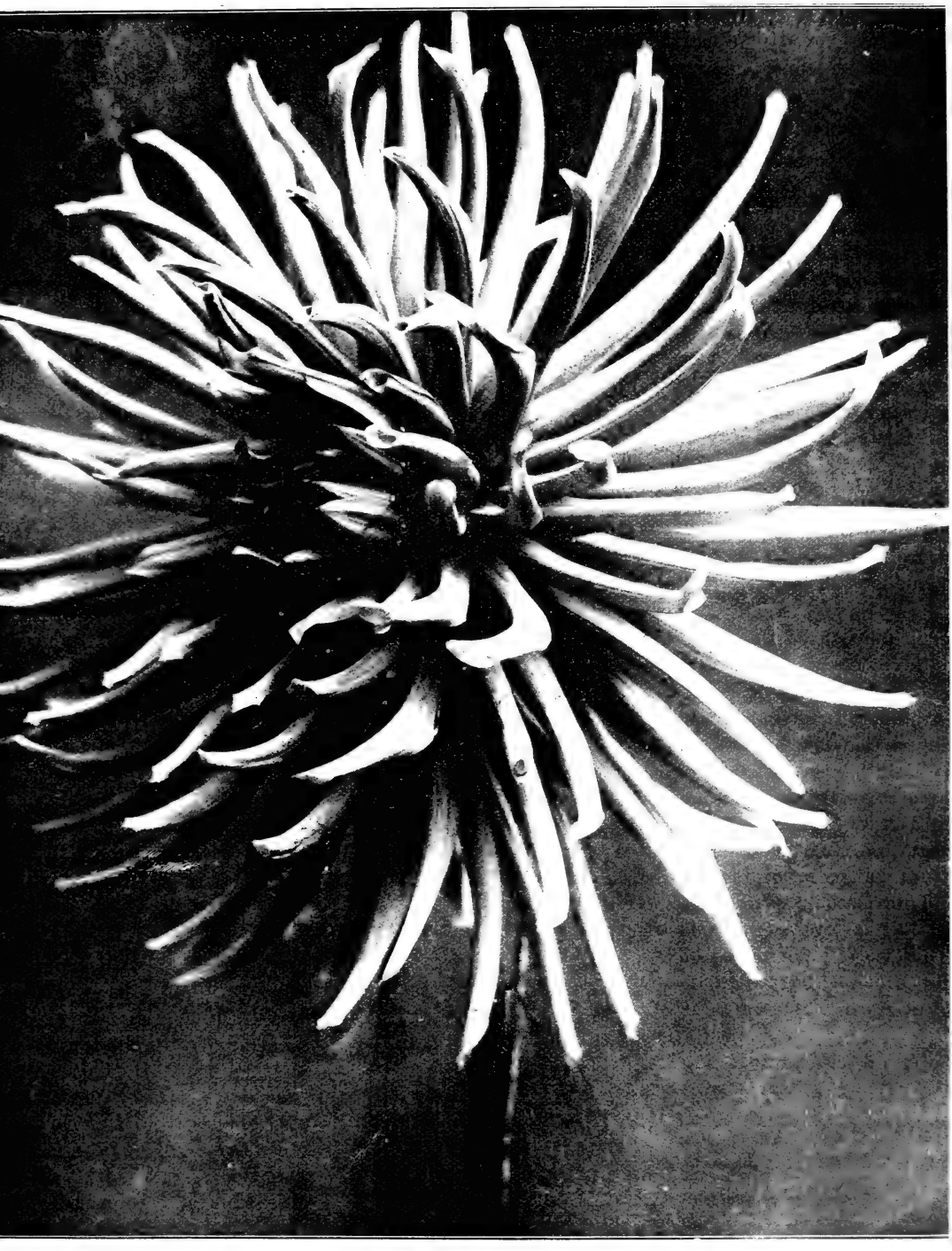


FIG. 79.—MRS. H. L. BROUSSON. SALMON ON PALE YELLOW. (*Strelitzia*.)

The next good feature I mentioned was *colour*: this should be of the natural tint appertaining to the variety, clear and clean, the florets unspotted, and in no way rubbed or damaged. The pale and unnatural tint

FIG. 80.—COMPT. SHADE ROSE SPECKLED WITH CRIMSON. (*Stredwick.*)

of a flower excessively shaded or grown in the dark should be considered a defect.

The next and last point I mentioned was the setting up of the flower, and I consider this should always be taken into consideration by the judges. Good flowers badly set up, with maybe their faces turned in

various directions, or the flowers set so close to the stand or board as to mar their natural elegance, should lose points in competition with another stand where these defects were non-existent.

Now if a certain number of points be allotted to each of the four properties or virtues I have mentioned, the judging of Dahlias resolves itself into a comparatively easy task: so many points will be given to good form, so many to good size, so many to colour and freedom from blemish, and so many for being well set up, in the case of every flower or set of flowers, and the sum of the points awarded will give us the key to the position of the various exhibits.

How great a number and what weight may be accorded to each of the four good features of a flower I of course must leave to the societies to determine; but having given the matter very much thought and considered it, I think from every standpoint, I may mention that I am in favour of adopting ten points as a maximum and dividing them as follows:—

4 points for good form.
3 „ „ size.
2 „ „ colour and freedom from injury.
1 point „ setting up.

In this way every perfect flower perfectly set up would gain ten points, a number easily reckoned, and the subdivision of which one can readily commit to memory.

In the case of judging bunches of one variety I would consider the bunch as a whole and not the individual flowers of the bunch, after the same manner as our friends of the National Rose Society judge trebles in the case of Roses.

VEGETABLES ALL THE YEAR ROUND FOR A PRIVATE FAMILY.

By W. H. Divers, F.R.H.S.

The subject given to me is a most extensive one, as it embraces the whole routine of the cultivation of all kinds of vegetables; and on collecting and comparing some of my notes I soon found it would require a fair-sized book to deal thoroughly with the whole subject. In order, therefore, to bring my remarks within reasonable limits, I have decided to omit the greater part of the cultural details, which may be found in any good work on gardening, and to notice chiefly the points which conduce to *the continuity of the supply*. It is also a subject upon which many disputes have arisen; we read of one which took place more than 3,000 years ago, when the children of Israel reproached Moses because they had not the Cucumbers, Melons, Leeks, Onions, and Garlic which they had had in Egypt in abundance. This is interesting to us as showing that vegetables were cultivated in quantity in those early days. We occasionally hear of similar grumblings and complaints now, but I generally find they are caused by the want of proper structures for growing vegetables in the dark days of winter and in the early part of spring. To keep up a good supply at these times a large quantity must be grown, because growth is very slow under such unnatural conditions.

The following kinds may be had throughout the year if proper facilities are given for their cultivation:—French Beans, Broccoli and Cauliflowers (the one being in season when the other is not), Cabbages, Carrots, Cucumbers, Mushrooms, Onions, Potatos, Spinach, Tomatos, and Turnips; and for salads, Lettuces and Mustard and Cress. Where means are available for retarding roots, this list may be extended to include Asparagus, Seakale, and Rhubarb. It is possible even now to purchase the roots of Seakale in a retarded state, but they are expensive, and I look forward to the time when a suitable retarding-house will be available in all good establishments.

Structures.—I will now refer briefly to a few structures without which it is impossible to have a continuous supply of choice vegetables during the cold period of the year. The chief place must be given to forcing-houses; these are necessary for French Beans, Cucumbers, Tomatos, Early Peas, Mustard and Cress, and also Vegetable Marrows if they are required early. I do not, of course, mean a house for each of these: it is quite possible to grow several of them in the same house; nor need the houses be necessarily large, but their number and size must depend upon the quantity of vegetables required. But it is especially important that they should be as light as possible, in order to catch all the sunshine possible, and they must be well heated. Lean-to or hip-roofed houses running east and west are the best.

For Early Potatos, Carrots, Radishes, Turnips, Lettuces, Beet, Asparagus, and succession crops of French Beans and Peas, brick pits

with movable lights 6 feet by 4 feet are quite sufficient; these must have a 4-inch hot-water pipe all round, with valves for adjusting the heat. Instead of brick pits, frames made of 3-inch deal planks may be used; they have the advantage of portability, and can have extra coverings in severe weather.

A good Mushroom-house is also necessary, but it need not be an expensive structure, though, owing to the moist atmosphere necessary for Mushrooms at all times, it must be built of substantial materials. For the elevated beds I find iron bearers, with Victoria stone for the bottoms and sides, are the most suitable. Where beds are placed one above another a space of 3½ feet clear should be left between them. A position on the north side of a wall is the best for this purpose. For although somewhat cold in the depth of winter, it gives better climatic conditions for late spring, late summer, and autumn crops. A flow and return hot-water pipe is necessary for severe weather. This building also serves for early Seakale, Rhubarb, and Chicory. For growing Mushrooms throughout the summer a cool cellar is necessary, the heat above ground being too great for this vegetable during June and July. I may perhaps be reminded that good Mushrooms can be grown on ridges of manure in the open air, but this system is not suitable where a continuous supply is required, and is only fit for market growers, who can deal with a large quantity of produce at varying intervals.

A few ordinary garden frames and some handlights complete the list of structures required for producing purposes.

Store Rooms.—These are necessary for Onions, Seed Potatos, and a supply of all roots in frosty weather; but any ordinary shed can be easily adapted to the purpose, the great desiderata being coolness without admitting frost, and a moderate amount of moisture for all except Onions and seed Potatos, which must be kept dry as well as cool.

A cold-storage room should be provided in all good gardens, as, besides providing facilities for retarding roots of Seakale, Asparagus, and Rhubarb, it would be useful for very many things not connected with our present subject.

But the chief aid to a good supply of vegetables is a good kitchen garden. The site chosen for this should have a deep soil that can be dug or otherwise operated upon in showery weather. After experience on limestone, sand, gravel, oolitic clay, lias clay, and Northamptonshire red sand, I found the last to be the best of all; it is easily worked to three feet in depth, and wet weather interferes with it but a very little; the chief advantage is perhaps the fact of its requiring such a small amount of manure; the only vegetable which did not succeed well with me on this soil was the Turnip, and probably this would have done better if the means of applying superphosphate, or a similar manure, had been allowed. It is a mistake to select a position for a garden on an unsuitable soil, and imagine that cultivation will compensate for that disadvantage. I have had some years of experience on a cold clay, and find an ordinary lifetime is too short to make such a soil into a good kitchen garden. If the ground slopes gently to the south it will be warmer and better drained, or a gentle slope to the east or west would be better than a dead level; but ground sloping to the north must be avoided. Shelter is extremely

valuable in the kitchen garden, especially on the north, north-east, and south-west. It has been usual to surround kitchen gardens with walls 10 to 12 feet or more in height, and these also serve the purpose of providing suitable positions for growing choice fruits. An idea was published some years since of building the glass-houses around the kitchen garden in place of walls, and thus saving expense when new gardens were formed, but I am not aware of it having been put into practice. Thick hedges of holly or yew are sometimes used for shelter; they have one great disadvantage, the roots travelling into the garden and robbing the vegetables. For the same reason large forest trees should never be grown within 100 yards of the cropping ground.

The shape of the garden has an important bearing on the supply of vegetables. For convenience of building the walls it is usual to choose a square or oblong shape; I much prefer the oblong if the longest diameter is from east to west, because it gives a greater extent of warm borders, *i.e.* those with a south aspect, and, conversely, cool borders with a north aspect. These are two important items in extending the supply of various vegetables.

The size of the kitchen garden must depend on the number of persons to be supplied, and we must remember that fruits of various kinds have usually to be accommodated in the same enclosure. The kitchen garden at Belvoir Castle, of which I have the honour to have charge, contains nearly 7 acres within the walls, and about $7\frac{1}{4}$ acres outside; in addition to this there are about 4 acres of orchards; so that we are not depending on the kitchen garden for a full supply of Apples and Plums, although some are grown there. Of the above total of $14\frac{1}{4}$ acres, the portion used for growing vegetables is $2\frac{3}{4}$ acres; about $2\frac{1}{4}$ acres are occupied by fruits of various kinds: the remaining $9\frac{1}{4}$ acres are occupied by greenhouses, vineries, the usual offices, and store rooms; a portion is devoted to herbaceous flowers; the necessary roads and walks claim a considerable part; and the remainder is used for growing a stock of plants for the spring bedding.

The $2\frac{3}{4}$ acres devoted to vegetables alone are thus divided among them: Taking the unit as 37 square yards, Asparagus stands at 32; Artichokes (Globe and Jerusalem), 8; Beans of various kinds, the chief of which are Scarlet Runners, 15; Brussels Sprouts, 14; Broccoli and Cauliflower, 24; Cabbages, 17; Carrots, 14; Parsnips, 3; Beet, 4; Celery, 27; Horse-radish, 8; Leeks, 3; Kale, 4; Peas, 36; Potatos, early, 15, mid-season or second early, 50; Seakale, 14; Spinach, 9; Onions, 19; Savoys, 20; Turnips, for autumn and winter, 9; Shallots, Garlic, Salsafy, herbs of various kinds, and things not required in large quantities, occupy portions of the remainder of the garden; Early Turnips are grown between the rows of Peas; Lettuces are grown between the rows of Celery; Summer Spinach between the rows of Peas; and a few other things in a similar way, and thus we make the most of the ground.

Rotation of Crops.—It is not always possible to follow a strict rule in this, as the quantity of the various kinds of vegetables required varies so much, but a few broad principles are adhered to; for instance, two crops of the same kind are not allowed to follow each other. Leguminous crops do not require so much nitrogen as green crops; they are therefore

followed by Cabbages, Brussels Sprouts, and such things which require a larger amount of nitrogen, and more soda, lime, and sulphuric acid, than Peas and Beans. The chief mineral constituent of Potatos is potash ; this vegetable should therefore follow a green crop such as Cabbages, which

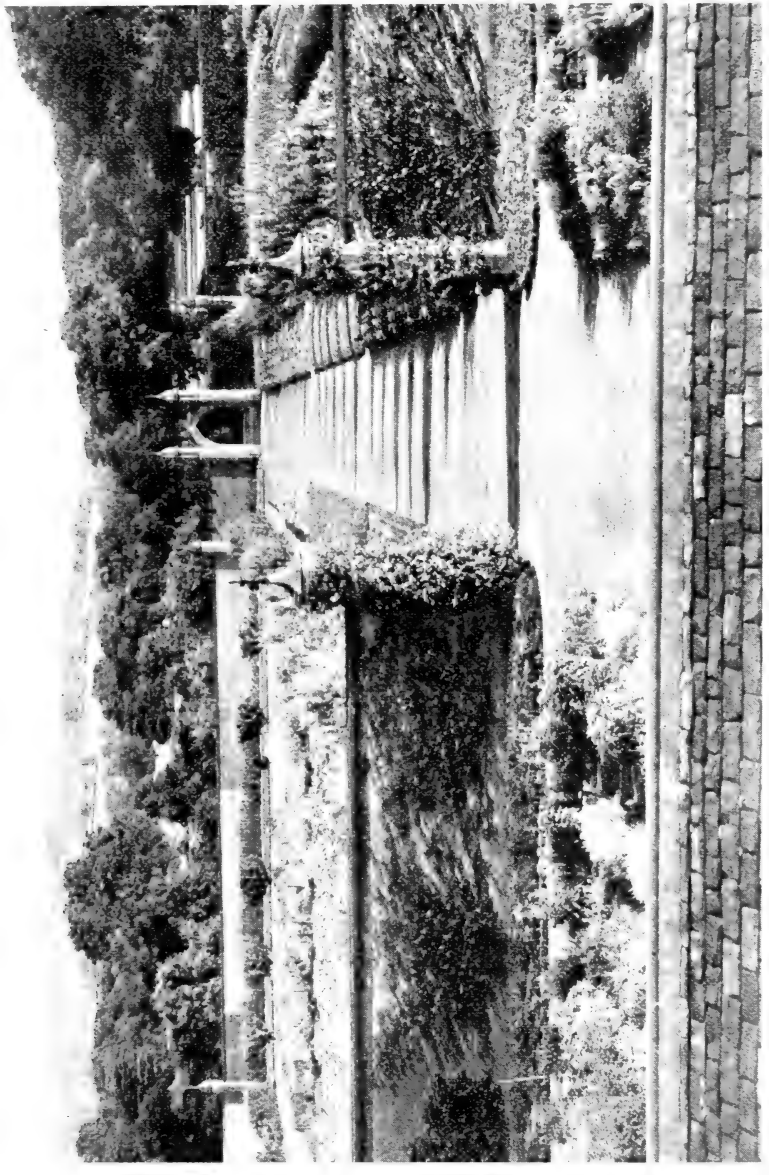


Fig. 81.—The Kitchen Garden, Belvoir Castle, looking South. (*From photo by Mr. W. H. Divers.*)

do not need so much of it. Carrots, Parsnips, and Beet form badly shaped roots if fresh manure is dug in shortly before sowing the seeds, and they also require ground that has been moved to a good depth when digging ; by sowing them on the ground previously occupied by Celery,

all these conditions are secured, as the ground always contains a quantity of fertilising material, which has not been appropriated by the Celery.

Sowing, Thinning, and Planting.—I will now give a few general notes on sowing and planting the various crops. I put the character of the seed in the first place, as it is of the utmost importance that it should be properly ripened, and of a true strain, and I strongly advise the grower always to purchase from a reliable firm of seed merchants, and always to sow new seed; old seed, and that which is cheap through being badly harvested, will come up weakly, if indeed it germinates at all, and will be a prey to every disease and insect peculiar to that particular plant.

Secondly, always thin the crop *early*, and thus let the young plants have a chance to grow vigorously from the first. I have seen a crop of Carrots ruined entirely through the thinning being delayed for a fortnight. This would not happen with all vegetables, but all young plants gain or lose strength very quickly, in proportion to the space allowed them.

Thirdly, for a private family, size is not the chief point to be considered, quality stands first; and next to that comes a continuous supply as long as it can possibly be maintained. Show vegetables are not appreciated by the consumer; moderate-sized produce, which can be cooked without slicing, will always be of the best flavour, if the cultivation has been good. Green vegetables, such as Brussels Sprouts, Cabbages, and others, are easily spoiled in flavour if an excess of manure is used. Many soils will grow these vegetables without fresh manure being applied; and if a dry period intervenes, and the grower is not satisfied with the progress made, it is an easy matter to give 3 oz. of superphosphate, and 1 oz. of nitrate of soda, per square yard, and hoe it in at once, or rake it into the surface with a coarse iron rake.

Where a large supply is required, I find it best to rely on varieties that have been thoroughly tested; new things should be tried in small quantities, and only if they promise to excel existing varieties. And I must complain here a little about the nurserymen. There are too many so-called "varieties" of many of our vegetables, and everyone is most anxious to add his own name to all of them. As an instance, a few months back I had the old 'International' Potato sent me, with the name of a firm of seedsmen attached to it. All this is really absurd; it makes no difference to the variety whether Dick, Tom, or Harry affix their names to it, and it is confusing to some of the growers. Again, a selection of some well-known variety is made, and sent out under a new name at an advanced price. I quite admit that extra work in seed-saving should be paid for, but I object to buying an old thing under a new name, and to find afterwards that I have abundance of the same thing elsewhere.

Kinds and Varieties of Vegetables.

Artichoke, Globe (*Cynara Scolymus*).—This is in season for a few weeks only in the summer, but is much esteemed by some on account of its flavour. A bed of it will last for years if kept clear of weeds, and protected with long strawy litter in the winter.

Artichoke, Jerusalem (*Helianthus tuberosus*).—Of this there are now two varieties, the old one with a reddish-brown skin, and the newer one, which is almost white, and I find it is preferred by some. When well grown it is a very productive vegetable, and deserves to have a fresh plot

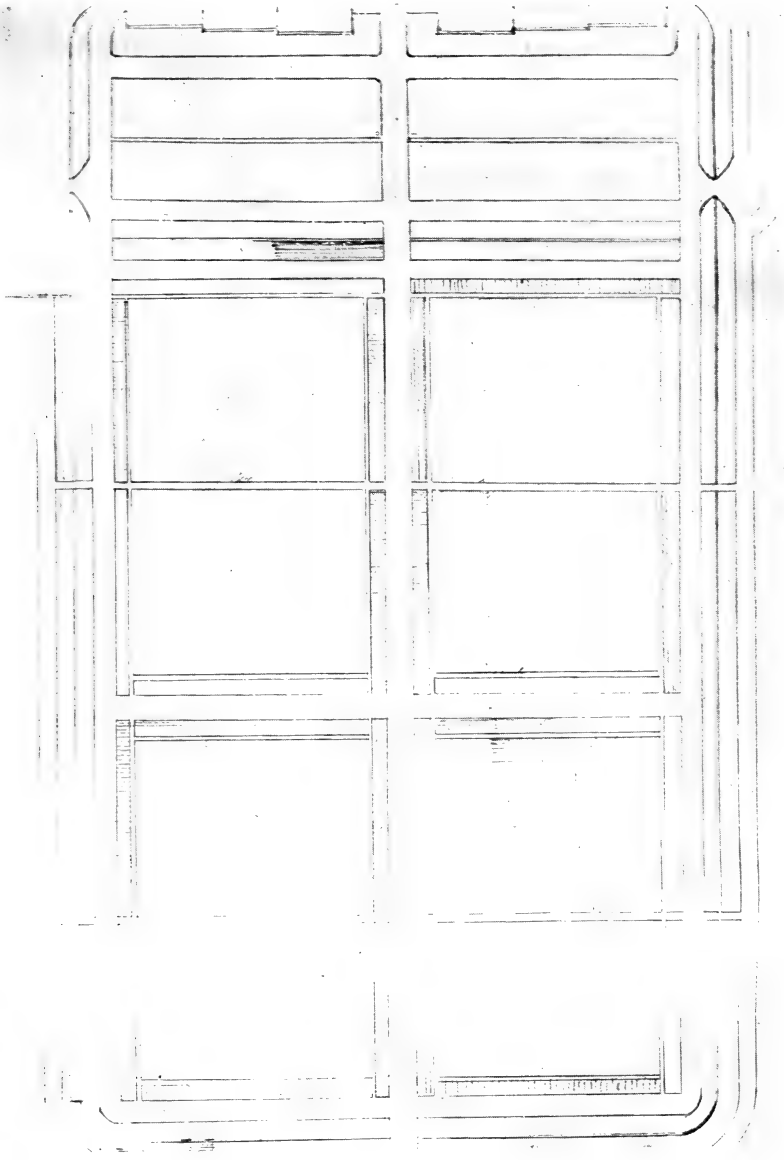


Fig. 82.—Plan of the Kitchen Garden, Belvoir Castle. The length runs from North to South. (Scale 123¾ feet to the inch.)

of ground, and some manure every year. It is fit for use from November to May.

Asparagus (*Asparagus officinalis*).—When cold-storage rooms are provided in all large gardens, I think there will be no difficulty in having a supply of this vegetable throughout the year. It comes into use, when

grown naturally, about the middle of April, and continues for some six or seven weeks, after which it is necessary to allow all growths to remain, in order to recuperate the strength of the plant. Beds will continue to yield well up to a great age if kept clear of weeds, and manured as required. I remember seeing some in Scotland that were over a hundred years old, and were still doing well. These were planted by a gardener named Adam, and visitors were sometimes made acquainted with this fact by the master calling out to the gardener, "How old is this Asparagus bed?" the answer was, "I don't know, my lord, but Adam planted it." If the roots are to be lifted for forcing, I prefer those of a moderate age, as they can be packed closer together in the frames, and are more vigorous. It is a good plan to make one or two new beds every year, and to lift the same quantity for forcing. I prefer planting on the level to the raised beds which were formerly used. A coating of manure in autumn is not necessary, and I have for some years discontinued that system in favour of mineral manures, applied in the spring; the beds are thus left fully exposed all the winter. From October to January the pits or frames used for forcing should have hot-water pipes round them, as well as fermenting material underneath; after this time an ordinary hotbed is sufficient. There is not much difference in the so-called varieties, for the size of the shoots depends largely upon the amount of food the plant can get, but selection has also some amount of influence; the 'Early Purple Argenteuil' comes into use a few days before the ordinary variety. A tradition has long been prevalent in gardens that two-year-old plants are better than three-year-old for planting new beds. I have this year tested this, and find the two-year-old have grown almost twice as strongly as the three years; tradition is right in this instance.

Beans, Broad (*Vicia Faba*).—This vegetable is not much in demand in private gardens, except for supplying the servants' hall; in the South of England it is often sown in November to stand through the winter, and by making successional sowings in spring it may be had, if required, from May to November. The points of the plants should always be picked off as soon as the flowers commence to open: a much better crop is obtained in this way. Autumn sowing does not make much difference in the earliness of the crop. At Tandridge, in Surrey, the 'Mazagan' variety, sown January 2, 1878, was ready for use on July 1, and 'Harlington Windsor,' sown May 7, 1878, was ready for use July 10. At Ketton Hall, Rutland, 'Johnston's Wonderful,' sown November 3, 1886, was ready July 6, 1887; and the same variety sown April 4, 1887, was ready July 10.

Beans, Kidney or French (*Phaseolus vulgaris*).—Where suitable houses are available for the winter supply, this vegetable may be had throughout the year. A minimum temperature of 60° is necessary during the winter, and a house facing south, where it can get the full benefit of the sunlight. After March is over this is not so important, and succession crops may be sown in frames to keep up the supply, until the early crops are ready outside. At Belvoir it is not safe to sow outdoors until early in May, and these must be on a south aspect. They are ready for use early in August, but in more favourable districts they may be sown much earlier and do not take so long to mature. Sowings should be

made for succession, at intervals of a fortnight, until September, when they must be sown in frames for the November supply; and in October pot culture should be commenced for the winter, and a sowing should be made every fortnight. The soil for this winter culture must be light and porous; one half turfy loam, chopped into small pieces, and the other half flaky leaf mould, will suit them. 'Osborn's Forcing' is a good variety for winter, as also is 'Sir Joseph Paxton.' 'Canadian Wonder,' 'Smythe's Hybrid,' and 'Paris Red' are good for summer crops; the last is only fit for outdoor culture. The running varieties, 'Tender and True' and 'Epicure,' are valuable for summer crops, and keep up a supply without such frequent sowing as the dwarf ones require.

Beans, Scarlet Runners (*Phaseolus vulgaris multiflorus*).—This is one of the most useful vegetables we have for summer and autumn use; but, owing to its roughness and somewhat strong flavour, it is not always welcome at fashionable dinners. Good varieties are 'Laxton's Czar' and 'Sutton's Best of All.' Sown at Belvoir May 17, they were ready for use August 5, and continued until destroyed by frost. In seasons when seed is scarce, the roots may be lifted, and preserved in a cellar, in sand, until the following spring.

Beet (*Beta vulgaris*).—Beet can be had throughout the year, if a sufficient quantity is grown, by keeping the roots in a cool cellar until the young ones are ready in the spring. The "Turnip-rooted" variety is the best for early use, and may be hastened considerably by sowing under glass in March and planting out later, or by growing it in frames. 'Dell's Crimson' is a good reliable variety for general use.

Broccoli and Cauliflower (*Brassica oleracea botrytis*).—These are grouped together because botanically they are the same, as a vegetable for table they are interchangeable, and by growing both it is possible under favourable circumstances to have a supply throughout the year. The season of Broccoli commences about Christmas with 'Snow's Winter' and 'Sutton's Christmas White.' The former is not so good as it used to be, many of the heads being worthless, and I prefer 'Christmas White.' In the Midlands and Northern districts a cool glass-house is necessary to protect them in severe weather; they should be lifted and planted inside in November. These varieties are followed by 'Adam's Early,' a good old friend when true to name (it has deceived me this year, for the first time, by coming in after 'Leamington'); the latter should follow early in March and is hardy enough to stand an ordinary winter in the Midlands. 'Knight's Protecting' follows, and 'Gilbert's Victoria,' which is the best and latest of all the late varieties, finishes the Broccoli season about the middle of June. Cauliflowers sown about August 20 and protected with handlights during the winter then come into use, 'Veitch's Pearl,' 'Early London,' and 'Sutton's King' in the order named. These are followed by a successional planting-out from the same sowing, of plants which have remained in the seed-bed under a frame all the winter, and have been planted out at the end of April, a few being lifted out of the handlights at the same time. When these are over, those sown in April, consisting of the same varieties, are ready, and they carry on the supply until 'Veitch's Autumn Giant' is ready; this is followed by 'Veitch's Self-protecting Autumn' until the end of the year. It may be useful to

mention here that Cauliflower and Broccoli may be kept for ten days, if pulled and hung up head downwards in a cool shed, and this is sometimes necessary when the succession crops are not quite ready. The times of sowing at Belvoir are, for early Broccoli, the middle of April; for late Broccoli, the end of May; for Cauliflowers for handlights, the third week in August; the same varieties for succession, the middle of April; 'Veitch's Autumn Giant' and 'Self-protecting Autumn' also in the middle of April.

Brussels Sprouts (*Brassica oleracea gemmifera*).—For cold districts this is one of the most reliable of green vegetables for standing a severe winter if a good hardy strain is grown. After trying all the varieties I could obtain, a few years since I fixed upon 'Veitch's Exhibition' as the most useful for my purpose, and I still adhere to it, as it gives a good crop of Sprouts of medium size and good flavour. I always sow the earliest crop on a gentle hotbed in a frame early in February, and put the plants in their permanent quarters as soon as large enough. A succession lot is sown in the open ground in March; although not ready so early, these give a good crop; the old stems are allowed to stand and produce greens until exhausted. Only a moderate supply of manure must be used for this vegetable, or a strong flavour will be produced. It may be had in season from September to April.

Cabbages (*Brassica oleracea*).—Where a large number of people have to be supplied with vegetables, this ranks next to Potatos, on account of its productiveness. It can be had fit for use, either as Coleworts, Greens, or hard Cabbages, throughout the year. It is essentially a poor man's vegetable, and is seldom required for select dinners. I usually grow only three varieties of white Cabbages, viz. 'Ellam's Early,' which comes quickly into use in spring, but does not keep well after it is ready for cutting; 'Mein's No. 1,' which comes into use almost as early and stands wet weather better; and 'Enfield Market,' a useful one for summer supply. The seed for the earliest planting is sown about July 20; the time they are ready for use varies much according to the season. One year they were ready on December 20, another year February 1; but usually the date is near the middle of April. Whey they are cut, the stems and as many leaves as possible are left, and produce a good crop of small heads ready for use as soon as the main crop—which is sown the third week in August—is over. 'Little Pixie' and 'St. John's Day,' sown the last week in May, come in during October, and continue until severe frost comes. Coleworts sown at the end of June are then ready, and last in good condition until the first week in March; and if the early spring supply is not ready then, we have the old bed to cut greens from, until the young ones are fit for use.

Red or Pickling Cabbages.—These are sown about the middle of August, and planted out in the spring following; they require no special treatment. 'Red Dutch' is the variety usually grown.

Carrots (*Daucus Carota*).—Carrots may be had for use throughout the year, and there is always a demand for them for flavouring soups, even if they are not required as a separate dish. By sowing 'Early French Horn' on hotbeds the first week in February, it will be fit for use early in May; the same variety and 'Early Nantes,' sown on a warm border early in

March, will be ready early in June. To follow these we have the main-crop varieties—in my case 'Veitch's Model' and 'Veitch's Main Crop'—sown early in April. These continue the supply until the frame Carrots are ready again in the spring. It is possible in the South of England to have young Carrots all the winter by sowing 'Early Scarlet Horn' in August; I have not been successful with this in the Midlands. Carrots require the ground to be deeply dug and pulverised a considerable time before sowing.

Celery (*Apium graveolens*).—This may be had for use during nine months of the year. By sowing in moderate heat early in February, it will be ready early in August. 'Wright's Giant White' and 'Leicester Red,' are two good varieties for early use. I always have the main crop sown under glass, on a mild hotbed, early in April; 'Sandringham Dwarf White,' 'Veitch's Superb White,' and 'Major Clarke's Red' are the varieties grown for this purpose. Good cultivation, with an abundance of water at all times, is necessary, in order to get good Celery; and, to prevent running to seed prematurely, there must never be any check to the growth, from the commencement until the finish.

Chicory (*Cichorium Intybus*).—This is chiefly used in salads, during severe weather, after Endive is over. It should be sown in May, the roots being lifted in November, and stored in a cool cellar, or store rooms, or outdoors in a sheltered corner until required. To prepare it for use it should be placed in a mushroom-house, or similar building, where it is quite dark and warm, when it will be ready for use in about fourteen days. It is grown very largely in Belgium and sent over to the London market under the name of 'Whitloof.'

Chou de Burghley.—This is a most useful vegetable if sown at the end of June; it is then fit for use early in February, and is like small Cabbages, though of a nice delicate flavour, quite distinct from an ordinary Cabbage. Many growers have been disappointed with it from sowing too early in the season, when it grows very large and fails to stand severe weather. It was raised at Burghley, and distributed in 1883, by the late Mr. R. Gilbert, who was one of the best vegetable-growers of his time.

Cress (*Lepidium sativum*) is much used for salads. The variety most commonly grown is known as "Plain," and it is possible to have it fit for use every day in the year, if suitable houses are available for its culture during the winter months, November to January inclusive, when a temperature of 60° to 65° is necessary; after this, ordinary frames will answer until April, when it may be sown outside.

Cucumbers (*Cucumis sativus*).—These may be had throughout the year, if light, well-heated houses are provided for the winter crops. I find August 15 is a good date for sowing those required to provide fruit from November to March. A portion of these plants ought to be reserved for fruiting after Christmas, by keeping the fruit picked off until the end of December. As soon as the days lengthen, more seed should be sown to replace these plants, and with good culture they will give a supply through the spring and summer. A lumpy, porous soil, through which water percolates freely, is best for this plant, especially during winter; it may be composed of turfy loam, chopped up and separated from

the fine particles, and half-decayed leaves, chopped up roughly, used in equal quantities. Frequent top-dressings of a similar compost are beneficial. The temperature should never be allowed to fall below 60° in the coldest weather, and a bottom heat of 65° should be maintained. A good selection of 'Rollison's Telegraph' is still one of the best for winter crops, and there are numerous varieties which succeed well in the summer.

Endive (*Cichorium Endivia*).—This is useful for salads during the summer and autumn, for which purpose it should be sown in June, and afterwards blanched by covering. 'Round-leaved Batavian' and 'Green Curled' are good varieties.

Herbs.—Various kinds, including Basil, Borage, Fennel, Hyssop, Lavender, Marjoram, Rosemary, Chamomile, Chives, Mint, Pennyroyal, Sage, Sorrel, Tarragon, Thyme, Parsley, and Savory are required; time and space forbid these being mentioned here at greater length. They are for the most part perennials and shrubs, of easy culture, and should be planted out in an orderly and decent manner.

Horse-radish (*Cochlearia Armoracia*).—This vegetable pays for good cultivation where a large quantity is required. The ground should be trenched deeply, and have a liberal supply of manure, before planting, and afterwards must be kept clear of weeds.

Kale (*Brassica oleracea fimbriata*).—Few vegetables are so hardy as the 'Scotch' or 'Curled Kale,' and it is of much better flavour than many of the things used for "greens" in the spring. 'Asparagus Kale' is also of excellent quality, but I have had to discontinue its culture owing to persistent attacks of fungus in early spring, which destroyed the full-grown plants. 'Cottager's Kale' is a well-known and hardy variety which does not fail in the severest winter. All of these are sown about the middle of April, and come into use in the following March, continuing only a few weeks.

Leeks (*Allium Porrum*).—A very useful vegetable for autumn, winter, and early spring. Its cultivation has improved considerably during recent years. For Midland and Northern districts, the seed should be sown under glass in January, and the plants grown in pots for a time, until the weather is fit to plant them outside. 'Ayton Castle Giant' and 'The Lyon' are both good forms.

Lettuces (*Lactuca sativa*).—With care and attention it is quite possible to have Lettuces all through the year if proper facilities are given for their culture. In regard to structures for winter cultivation, nothing more ambitious than an ordinary garden frame is required. But here I must emphasise the fact that Lettuces are very capricious things during the dark cold days of winter; no matter how careful the grower is, there are sure to be many deaths among the plants, especially if the soil is naturally cold and damp. I think that most people will agree that the old 'Brown,' or 'Bath Cos,' is the best variety for crispness and flavour. It has one fault, in that it runs to seed so soon in the summer; for this reason we have to rely on the 'White Cos' varieties from the end of June to the middle of November. The first sowing of 'Bath Cos' is made about July 12; this is ready for use in the middle of November, and frames are then put over it for the winter. It lasts until the end of March, when the

next sowing, made on August 4, is ready. This lot has to be planted on a south border, in the autumn, and covered with frames when severe weather comes; the frames are taken off as soon as severe frost is over in spring. This sowing has to last until the middle of May, when the next sowing, which was made the third week in August, is ready. These are grown close to a south wall all the winter, without other protection. I generally put a frame over those left in the seed-bed, and plant some on the north side of a wall in spring; they do not run to seed so early as those by the south wall. But about the end of June the 'Brown Cos' is finished, and at this time 'Alexandra Cos' (a select form of the 'Paris White'), which was sown on a mild hotbed the first week in February, is ready for use. These were planted out when large enough, first under handlights and then between the Celery trenches. The next two sowings are made at intervals of a month, outside; and the following ones, up to July 12, at intervals of a fortnight, and a supply of Lettuces is thus maintained throughout the year.

Mushrooms (*Agaricus campestris*).—There is not much difficulty in obtaining a good supply of Mushrooms if a few leading points are observed. The spawn must be fresh, and good; manure must be obtained from stables where the horses are fed on corn, and have very little green food; it must be carefully prepared, by throwing it into a heap of not more than one foot in thickness, and should be turned over frequently until the strong heat has passed away; it will then be ready for making up into a bed in the mushroom-house. As soon as the heat has declined to 85° after rising to the maximum, the spawn should be inserted; this must be broken into pieces, about the size of a hen's egg, and placed about one foot apart each way, just under the surface of the manure, and the whole beaten firm afterwards, and covered one inch deep with a nice friable loam from a grass-field. The temperature of the house should not go below 60° until the first Mushrooms are ready, when it may be allowed to fall to 55° unless other beds are in progress. Beds made up and treated thus should come into bearing in six weeks, and will continue for a similar period, so that the question of a regular supply depends upon making up succession beds; and for giving a supply in June, July, and August a cool cellar is necessary, as the ordinary mushroom-house is usually too warm during those months.

Mustard (*Sinapis alba*) is used for salads, and may be had throughout the year, if warm houses are available during the winter months, when it requires a temperature of 60° to 65°. After January it may be sown on ordinary hotbeds, and in April and afterwards it will succeed in the open air.

Onion (*Allium Cepa*).—I am not an admirer of very large Onions, the growing of which has become almost a craze with some people. Roots 2 to 4 inches in diameter are far the most useful, and may be obtained with a tithe of the labour required for 2 and 3 lb. roots. For the main crop it is important that the ground should be dug up early in the autumn, and a good supply of rich manure added. The seed should be sown in February if the ground is in a suitable condition, the chief point being a dry pulverised state of the soil, to ensure the covering of the seed with the smallest portion of earth. It is also very important that the

ground should be firm. The varieties I rely upon are 'Veitch's Main Crop,' 'Sutton's A 1,' and 'James's Keeping,' with a few of the small 'Silver-skinned' for pickling; these form the main crop. For the autumn sowing 'Giant Rocca' is preferred, but any of the 'Red Tripoli' breed are hardy, and may be used. The time for sowing them at Belvoir is the third week in August; they are ready for use in the following June, and generally give a supply until October, and as the spring-sown ones are ready in August, there is but little difficulty in having Onions for use throughout the year.

Parsley (*Apium Petroselinum*).—The supply of this herb often fails in severe winters, chiefly owing to growth being almost absent during December, January, and February. It is a good plan to sow a plot of suitable size to be covered with frames during severe weather, as severe frost damages the leaves; it should be sown early in the year, and is ready for use three months afterwards.

Parsnip (*Pastinaca sativa*).—There is but little demand for this vegetable in most gardens. To have it in a good tender condition in spring it should be stored out of doors when lifted in the autumn. A sheltered corner, where it can be covered with soil, is all that it requires; it should be sown early in April, and may be had fit for use eight months in the year.

Peas (*Pisum sativum*).—This is perhaps the greatest favourite among vegetables, and a good supply as long as it can be maintained is required in all gardens. By sowing dwarf varieties, such as 'Chelsea Gem' or 'Sutton's Forcing,' in pots, in January, and growing them on shelves of vineries or peach-houses, they may be had fit for use early in April; succession crops of the same varieties may be sown in heated pits so as to carry on the supply until June. On referring to my cropping book I find the first Peas have been ready outside at Belvoir from May 30 to June 30, a difference of one month in the ten years 1894 to 1903 for early Peas. I still practise the old system of sowing on a warm border early in November, and the best variety I have found for that purpose is the old 'Laxton's Standard.' Having a very cold clay soil, I find many varieties will not survive the winter which would be hardy elsewhere. 'Standard' is not a marrow Pea, but it is of much better quality than 'Sangster's No. 1,' and similar varieties which used to be the favourites for autumn sowing; it comes into use a fortnight before 'Criterion,' which is good for general use in early summer. For the main crop we have nothing so good as 'Ne Plus Ultra,' an old variety which has been re-christened a good many times; its great fault is in growing six feet and upwards in height. Messrs. Sutton have this season sent me a new dwarf variety which is almost identical in flavour. 'Autocrat' and 'Sturdy' are two of the best for August and September, and such as 'Standard,' 'Exonian,' and 'Criterion,' which fill well in dull weather, may be sown at the end of June for the October supply. It is not possible to continue the supply of Peas during the winter months, a considerable share of sunlight being indispensable for them when the pods are filling; heat alone is not sufficient. Perhaps when electric light becomes more generally used as an aid to plant culture, we may be able to extend the season considerably. Deep cultivation is necessary in order to grow Peas to the best advantage during

summer; and a good supply of manure is a great help to them in hot dry weather, if it is buried deeply in the soil before sowing. To succeed those sown in November, we sow as early in February as possible. 'Duchess of York' and 'Criterion' are the favourites for this sowing. 'Duchess of York,' sown this year on February 20, was ready for use July 2, and 'Criterion,' sown the same day, was fit to gather on July 8. Early in March 'Criterion,' 'Telegraph,' and similar varieties are best, and on warm soils 'Ne Plus Ultra' may be sown then; a fortnight later this variety and other wrinkled marrows may safely be sown, and sowings once a fortnight afterwards until the middle of June should be made. At the end of June we sow the hardier kinds again, and thus keep up a supply from early June to the end of October. I ought to add that Peas sown in pots under glass in January, and planted out when ready, are fit for use quite as soon as those sown in November, but in my case all the room under glass is required for other things.

Potato (*Solanum tuberosum*).—Most people consider this vegetable indispensable for luncheon and dinner. I fear we are losing flavour in our rush for heavy-cropping varieties, and in my opinion there are none to compare with the 'Ashleaf' varieties for private use. They have one disadvantage in being of a yellow colour when cooked, and for some reason which I cannot understand many people have an idea that good Potatos should be white when cooked. I am certain the white Potatos are, as a rule, of inferior flavour, and in some instances they lack it entirely. Personally I think the objection to a yellow Potato is most unreasonable; we may eat eggs, Yorkshire pudding, butter, and an endless variety of things which are yellow, but yellow Potatos are not admissible. I greatly prefer the 'Ashleaf' varieties for the earliest crops for private use, and still grow the 'Old Ashleaf,' 'Myatt's Ashleaf,' and 'Empress Eugénie,' which is the same as a variety distributed some years since under the name of 'Wilson's Ashleaf.' By planting an ordinary hotbed early in February we have new Potatos ready by the middle of April, and if pits are used with hot-water pipes round for this early planting they will be ready a fortnight earlier. I have sometimes grown a few in pots or boxes in an early Peach house and thus got some ready before those in the pits, but I only got a very small crop. Potatos must have a fair amount of light as well as heat to mature them, and it is possible the electric light may yet help us in getting them ready for use sooner. After the 'Ashleaf' varieties are used I find 'Snowdrop' the best for quality that I can get, and it has the great merit of being good on a clay soil as well as on limestone. This variety is planted in the second week of April, and is ready for use the first week in August; it also keeps of good quality through the winter months. For the latest crop 'British Queen' and 'Magnum Bonum' are the best flavoured, and they are also good croppers. 'Up to Date' is only fit for cattle-feeding, it has no flavour; its only merit is a strong constitution which resists the disease. Late Potatos should be grown on a limestone soil, and pay well for good cultivation. In an old manuscript in the Belvoir Castle collection it is recorded that twenty Potato roots were purchased, among other provisions, when James I. visited Belvoir in 1612; the price given is not stated. We now use about thirty tons in a year.

Radishes (*Raphanus sativus*).—Much used in salads, and as a dish whole, with cheese, and for the tea-table. They are mostly in request early in the season, and may be had ready for use in four or five weeks if sown under glass on hotbeds. I prefer the 'Olive-shaped' varieties for the earliest sowings. In March they may be sown on warm borders outside, but later in the summer a cool border is the best place.

Rhubarb (*Rheum Rhaponticum*).—Roots of the variety 'Linnæus' are lifted and put in the mushroom-house during the last week in November; the produce from these is ready for use during the last week in December; other lots are lifted and brought in as required. A large portion of one of the outside beds is covered with wooden covers over the crowns in the first week of January; fermenting material is then built up over the covers, and produce from this is ready in three weeks. Succession lots are covered as required until the outside temperature increases and the crowns start without covering. The best flavoured variety is a very small one called 'Tobolsk,' but owing to its weakly growth it is not so suitable for forcing as 'Linnæus' and 'Hawke's Champagne.'

Salsify (*Tragopogon porrifolius*).—This vegetable is but seldom used, but may be had from October to April by sowing the seed in May, and storing the roots like Parsnips.

Savoy (*Brassica oleracea bullata*).—A useful vegetable for ordinary purposes in the autumn, but it is generally somewhat strong in flavour. The late Mr. R. Gilbert crossed it with 'Chou de Burghley,' and obtained the best flavoured variety I have met with. It was sent out under the name of 'Gilbert's Universal.' Other good varieties are 'Early Ulm,' 'Green Curled,' and 'Sutton's New Year;' the last being very useful if not sown too early, as it stands the severe weather better than others, and is in season in January. I usually sow these about the middle of May.

Scorzonera (*Scorzonera hispanica*).—The roots of this vegetable are occasionally used, but it does not find much favour in this country. The seed should be sown in May, and the roots are fit for use from November to April.

Seakale (*Crambe maritima*).—This vegetable may be had for use in November, and a continuous supply can be maintained until the end of April without much difficulty; it may perhaps be continued throughout the year by using retarded crowns, but I cannot speak from experience on this point. It may be grown in various ways. I prefer lifting the crowns and putting them into the mushroom-house; they thus produce growths clean and free from any strong flavour. The necessary roots may be grown in one year if cuttings are started under glass, planted out when ready on rich soil, and encouraged to make a strong growth. I start the first lot in the mushroom-house the third week in November; this is ready for use in a month, and succession lots are started as required. As the season advances less time is required for growth, and the last crops are obtained from roots covered with leaves in a cool place outside. The white variety I remember for more than forty years; it was afterwards sent out under the name of 'Lily White.' It takes longer to force than the red-tipped variety, but is of better colour when cooked. A new one

called 'Beddard's Improved' is distinct in foliage from either of the above, and promises to be a great improvement.

Shallot (*Allium ascalonicum*) is used for flavouring soups and sauces, and for pickling. It may be had in condition from July until April, and is of easy culture.

Spinach (*Spinacia oleracea*).—This is always in request, and with the aid of 'Spinach Beet' may be had throughout the year without much difficulty. A sowing is always made about the middle of August; this is ready for use early in October; another sowing is made about ten days later, and these carry on the supply throughout the winter (if the weather is not extra severe), and continue to yield a supply until the last week in May. By sowing in March we get a commencement with the summer crops as soon as the autumn sowings run to seed; these spring sowings are made once a fortnight until the end of May, and continue the supply until the 'Spinach Beet' is ready, which is about the middle of July, having been sown in the middle of May. This 'Spinach Beet' is really an excellent vegetable, and is of better flavour than the true Spinach when cooked; it is not a favourite with the cooks because it takes a little more preparation before cooking. 'New Zealand Spinach' (*Tetragonia expansa*) is sometimes recommended for the summer supply; it requires raising under glass and planting out, and is not much grown.

Tomato (*Lycopersicum esculentum*).—Really a fruit, but included here because generally used as a vegetable. It is a native of a much warmer and drier climate than ours; it is not always possible to ripen it in the open air. In gardens enclosed with walls it may be planted in any available space between the fruit-trees, where it can get a fair amount of sunshine. I have known good crops ripened on warm borders, trained on stakes, in the midland counties in hot seasons. The chief aim of the cultivator should be to sow early in February, and grow the plants large before planting them outside; this sowing, whether for growing outdoors or under glass, will carry on the supply until the middle of November. For the winter supply a good house, well heated and facing the south, is necessary. The seed for this crop should be sown in June, and grown all the time in pots; and in order to have the fruit ripe early in the year they must be set before the dark days of winter, and kept steadily growing afterwards. For outdoor culture and summer crops under glass I grow a selection from 'Hathaway's Excelsior' called 'Gilbert's Surpasse'; for winter-fruiting a smaller variety, such as 'Lady Bird' or 'Winter Beauty,' is preferable.

Turnips (*Brassica Rapa*).—This vegetable may be had throughout the year, but in the early months it will only be fit for flavouring purposes. By sowing 'Early Milan' in the middle of January on hotbeds they will be ready for use in the middle of April. They must have careful attention while growing, as they are very liable to run to seed without forming roots; this, too, is often the case with the earliest sowings outside. Early Turnips, as a rule, are a very capricious crop, and cannot be depended upon if sown before April. I find the large well-matured seeds are the best, and are not so liable to succumb to attacks of the Turnip fly or beetle. For sowing early 'Sutton's Scarlet Perfection' is one of the best,

as it does not run to seed so quickly as some other varieties, but 'Early Milan' is perhaps best of all. After April I rely chiefly upon 'Early Snowball' until the middle of June, when 'Veitch's Red Globe' is the best variety. For the winter supply 'Sutton's Green Top' is hardy and of good quality; and for sowing in the middle of August, which is the latest, 'Chirk Castle' is best, as it keeps sound longer than others.

Vegetable Marrow (*Cucurbita Pepo*).—It is usually grown for summer use only, but the season may be much extended both early and late by growing it under glass. Sown in pots under glass the first week in April, and planted out on a hotbed under handlights as soon as large enough, the produce will be ready about the middle of July, and will continue until destroyed by frost. The variety I prefer is the 'Long White;' 'Moore's Cream' is also useful.

Yam (*Dioscorea Batatas*).—Sometimes distinguished among other Yams as the Chinese Yam. This was brought prominently into notice about forty years since as a substitute for Potatos, at a time when the Potato disease was very prevalent. In warm situations with a deep soil it is easily grown; the chief difficulty connected with its culture is the excavation of the roots, which are very brittle and descend sometimes to a depth of three feet. It is somewhat similar to a Potato when cooked.

There are a few other plants which have been occasionally used as vegetables, including Mercury (*Chenopodium Bonus Henricus*), the young shoots of the Stinging Nettle, the young shoots of the Hop, the leaves of Sorrel, Chou de Milan, Couve Tronchuda, the fruits of the Egg Plant, Maize Cobs, the roots of Celeriac, Cardoon, *Oxalis crenata*, *Stachys tuberifera*, and *Tropæolum tuberosum*. They need not be further noticed here because they do not take with the public, and I do not think anything I can say in their favour would overcome people's disinclination.

Thus we find about thirty different kinds of vegetables are grown in gardens, in addition to salads and herbs; of these twelve may be had throughout the year, and even in the winter months upwards of twenty may be had if proper facilities are given for their cultivation, and enough of each is grown to sustain the supply as long as it is required. Complaints are sometimes made because no new kinds of vegetables are introduced. Mr. Carrington (who has charge of the old manuscripts at Belvoir Castle) lately showed me an old bill for garden seeds dated 1709, which only includes ten kinds of vegetable seeds besides Radishes, which shows that vegetables are cultivated much more extensively in these days, as the bill appears to be the full account for the year, and I take it to be a fair example of what would be grown in those days.* I do not consider that more kinds of vegetables are required, unless something can be found that is perfectly hardy in the coldest weather, and is quite distinct from anything we have at the present time. We certainly need greater facilities for growing winter vegetables in the majority of gardens, supplemented by cold-storage chambers, and possibly assisted by electric light. The question of electric light, however, requires further experiments before it is adopted extensively.

* I give a copy of this bill, as it may be of interest to many.

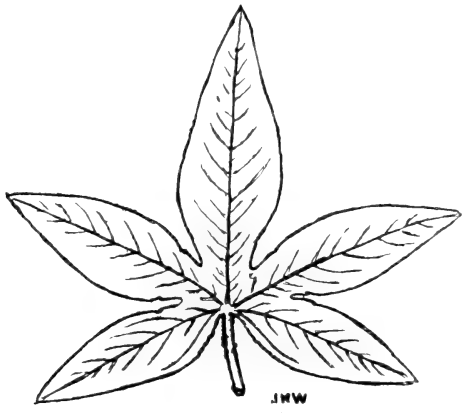
COPY OF AN OLD ACCOUNT PRESERVED AT BELVOIR CASTLE.

Bot. of James Fuller, December 5th, 1709.

		£	s.	d.
	For 12 Large wt. Dutch Currants	00	12	00
	Dutch Admiralls, 3 qts. 4*s.* 6*d.*, box 6*d.*	00	05	00
Jan. 28th, $17\frac{09}{10}$.	Orr Carrott, 1 lb. 5*s.* 4*d.*; Red Carrott, $\frac{1}{2}$ lb. 2*s.* 8*d.* .	00	08	00
	Stras Onion, 1 lb. 16*s.*; Spanish ditto, 1 lb. 14*s.* . .	01	10	00
	London Radish, 4 lb. 12*s.*; Round Spinage, 4 lb. 10*s.* .	01	02	00
	Cabbidge Lettuce, $\frac{1}{2}$ lb. 8*s.*; Dutch Brown ditto, 4*s.* .	00	12	00
	Silesia Lettuce, 3*s.*; Imperial ditto, 5*s.*.	00	08	00
	Cardus, $\frac{1}{2}$ lb. 4*s.*; Hottspur Beans, 2 qts. 1 . .	00	05	00
	Short Hottspurs, 2 qts. 1*s.* 4*d.*; Collyflower, 1 oz. 5*s.* .	00	06	04
	Purslon, 2 oz. 1*s.*; Ittallian Tuberosos, 2 doz. 10*s.* .	00	11	00
	Double bass matts, 3 dozen	01	16	00
	6 pruning knifes, 7*s.* 6*d.*; Scorzonera, 1 oz. 2*s.* . .	00	09	06
	Sasayfy, 1 oz. 2*s.*; Clary, 1 oz. 4*d.*; parsly, 4 oz. 4*d.* .	00	02	08
	Dutch Asparagus, 4 oz. 2*s.*; Time, 1 oz. 1*s.*; Hyssop, 1 oz. 1*s.*	00	04	00
	Swt. Marjoram, 1 oz. 1*s.*; Winter Savory, 1 oz. 1*s.* .	00	02	00
	Candytuft, 1 oz. 6*d.*; Swt. Scabious, 1*s.* . . .	00	01	06
	African and French Marrygolds	00	01	00
	Amaranthus Tricolor, 6*d.*; Belvidere, 6*d.* . . .	00	01	00
	Bushy Bazill, 6*d.*; Ittallian Peas, 3 qts. 7*s.* 6*d.* . .	00	08	00
	Box and Cord	00	01	06
Ap. 18th, 1710	Radish, 2*s.* 6*d.*; Wing pease, 1*s.*	00	03	06
	Dou Larksheel, 2 oz. 5*s.*; Cabb Lettuce, 2 oz. 2*s.* .	00	07	00
Sept. 10th	Canary Seed, 1 bushell 10*s.* 4*d.*; a large bag, 1*s.* 6*d.* .	00	11	10
		£10	12	04

Received of His Grace the Duke of Rutland,
November the 30th, 1710, Ten pounds
Twelve shillings in full of all Acco^{ts}.

JA. FULLER.



VEGETABLES FOR MARKET.

By W. G. Lobjoit, F.R.H.S.

I am not responsible for the subject. It was chosen for me; but for the treatment of the subject I am responsible, and as I am neither a botanist nor a scientist, nor able to weave golden fancies about common things, but a plain market-gardener, who is compelled, by the stern necessity of making a living amid the fierce competition of to-day, to look upon the things he grows as so many articles to turn into money, and is robbed thereby of much of the pleasure there is in growing for the joy of watching Nature's development, my readers must not be disappointed with plain treatment.

It will not be questioned that the supply of fresh vegetable food is an important factor in maintaining healthy life in large cities. Yet scarcely anyone would be found to deny that the methods for distributing the vegetables among our population are ludicrously inefficient; failing most where cheap and rapid distribution is most needed, viz. when the supply is abundant and cheap; interposing between the consumer and the grower unnecessary changing of hands, and sometimes re-carriage over the same road.

London, in area and in population, has outgrown the system that served to dispose of the limited supplies that came in on the carts and barrows of the market-gardeners who tilled the fertile lands of Stepney, Bermondsey, Vauxhall, Chelsea, Fulham, and Battersea, and were sufficient to meet the needs of the comparatively small population when the Georges reigned. It is hardly possible to-day to conceive of the state of things when Vauxhall Bridge Road was bordered by market-gardens, when Stamford Street was a walk through flower-gardens (yet the writer has talked with people who remember both), and when there was no over-sea supply. Now there is scarcely a market-garden left within ten miles of Covent Garden, and very soon the radius will be twenty miles, and cultivators as far south as the Antipodes, as far west as San Francisco, and as far east as Japan, are looking to England, and above all to London, as the chief market for their produce. Yet the market area of London is not appreciably enlarged: Farringdon Market that used to be has gone. There are the unchartered markets at the railway termini of King's Cross, St. Pancras, and Paddington; there is the G.E.R. market at Stratford, and the municipal market at Brentford—the only one of its kind in all London—and there have been one or two additions to the area of Covent Garden Market. Greengrocers from the outlying suburbs, where now the greatest residential population is, drive their vans in to take back produce which a few hours previously was carried along the same roads, perhaps passing their very doors. It is still the greengrocer's policy to sell a limited quantity at a high profit: would not the draper do the same if he had to fetch his goods in his own conveyance from a market five or six miles away, and be up in the small hours of the morning to do

it? Who has not heard from friends that certain vegetables are "awfully dear" or "not procurable," while precisely the same kinds have been shot out upon the stones at the market for the scavenger to clear away—unsaleable? The number of young women and men who "live in" at the wholesale and retail establishments seldom get any vegetables beyond the Potato upon their *menu*—they are too dear, or there is too much trouble in preparing them for cooking. The costermongers perform an invaluable service to the metropolis in bringing supplies of vegetables that are abundant, at cheap prices, within the reach of the dwellers in thickly populated areas, and even to suburban streets their voice is gone out, much to the chagrin of the highly rated greengrocer. It is to be hoped that, in those metropolitan districts where the "coster" question is acute, the authorities will bear in mind the highly important part he plays in supplying fresh and wholesome vegetable food at cheap prices to the masses and, while making all proper regulation for the highways, will provide the coster with ample facilities for carrying on his calling.

Who that has seen the dried, drooping, melancholy specimens of the vegetable world exposed for sale in the shop of some small suburban greengrocer has not wished for some means of preventing the perpetration of this libel upon the market vegetable? There is as much difference between shoe-leather and Cabbage as there is between this stale outcast of the *Brassica* tribe and the succulent Cabbage you cut fresh from your garden. Can you wonder that the English are not vegetable-eating people as they should be? Who that has seen vegetables of his own growing after they have been through the various stages between his yard and the retailer's shop, and has compared them with what they were when first fresh from the field, has not wished for some plan to enable townspeople to discover what vegetables really are? And if this is the case within the radius of horse carriage, what must it be when railway carriage introduces another handling or two?

The system of direct delivery to the shop of the retailer is slowly growing; perhaps, with the extension of motor traction, it may become easier.

The increase of local municipal markets like Brentford would be a great help; they would lessen the distance between grower and buyer, and their nearness would induce the retailer to attend the market oftener instead of getting two days' supply in one.

What I have said mostly applies, I am aware, to London, with which I am most familiar; but during a tour through the principal northern and midland towns, with business in view, I found that they were even worse supplied than London with fresh vegetables.

Are my readers calling these considerations commonplace, and comparing them unfavourably with those recondite and much more attractive themes usually dealt with in our Society's JOURNAL? Unfortunately, in thinking of market vegetables from a market growers' standpoint, the question of "market" presents itself with dominating urgency, at times obscuring the whole landscape, out of all proportion, perhaps, to true perspective. But what is the use of growing vegetables for market if your market fails you when you have grown them?

Two tendencies may be noticed as having been at work in recent

years among cultivators of market vegetables, each possibly an effect of the operation of the same economic causes. The one is the cheapening of the methods of cultivation: digging-ploughs have taken the place of spade trenching. Twenty-five years ago many acres of land in Fulham were bastard-trenched at 6*d*. a rod every winter. Planting by the line, where considerable breadths are cultivated, has given place to marking with a horse-racer. Radishes used universally to be sown by hand in beds previously carefully raked level, and afterwards "casted" with the spade; now they are mostly sown broadcast with a "fiddle," and "harrowed in," or even drilled with a horse drill. Asparagus used to be grown in beds 5 or 6 feet apart, "spitted" and "landed" with the spade every spring, after being forked down in the autumn; now it is planted in rows 3 feet 6 inches apart and moulded with the plough. When I left school a cart was not allowed upon the Rhubarb; manure was wheeled on, the crop was carried off; now the manure is carted on and the crop carted off. Twenty years ago, acres of Peas and Beans in market-gardens were grown on sticks, now such a thing is scarcely seen; the Peas are moulded to lie all one way, and the Beans are planted in rows half the distance apart, and stopped by picking out the tops of the shoots. There is possibly much room for ingenuity yet in cheapening production by saving unnecessary labour.

The other tendency is the increase in the variety of the crops grown: Celeriac, Tomatos, Aubergines, Corn-cobs, Whitloof, New Zealand Spinach, have all been added, so to speak, to the market-gardener's *répertoire*. At the same time the forcing of some crops has been almost entirely discontinued, and that of others increased, in some cases enormously. Among the former are Potatos, Radishes, Beans, Turnips; among the latter, Seakale, Rhubarb, Mint, Marrows, and to a limited extent Asparagus, the demand for this vegetable when forced seeming to be strictly limited.

A change, too, is coming over the methods of packing vegetables and sending them to market. The autumn Colewort and the early spring Cabbages used to be tied in bunches with the rod. Bunch greens used to be a staple article in the spring and autumn markets; now such are rarely seen; instead, when the plants have not hearted sufficiently to make Colewort heads or Cabbage, they are cut and sent to market in bushel sieves. The roots and stumps are thus left on the land instead of being carried to market, only to add to the refuse dealt with by the dust collector. Some old-fashioned baskets, such as barges, loads, half-loads, and rounds, are fast falling out of use. They were large, cumbersome, and very expensive. Cabbage packed high above the rims and laid with precision and neatness in loads and half-loads used to be the regular thing, and the art of packing them properly was a matter of pride; now cheap boxes are mostly used. The plan of loading vegetables like Cabbage loose upon vans may also be expected to be discontinued; for surely no more certain plan could be devised to secure the maximum of damage to the vegetable than the old process, which may be still seen followed in some places. The vegetable is cut, thrown into heaps, then thrown into a cart, carted off to the van, thrown to the loader, who stacks them upon the van like bricks in a wall; when at

market they are torn out of their tiers, thrown into a porter's basket or barrow, drawn out to the buyer's van, thrown into it, and stacked amongst a miscellaneous collection of barrels of Apples and Potatos, cases of Bananas, bunches of Turnips and Carrots, &c., finally arriving at the shop and being thrown out again. No wonder the article which finally reaches the consumer bears but a distant likeness to the Cabbage you saw growing in the field.

Nothing seems yet to have been devised to lessen the large proportion of expenditure upon labour necessary to get a crop of Radishes to market. Binding them costs 2*d.* a dozen, washing and packing another penny. The average price this season for weeks hardly reached 5*d.* a dozen. The crop is in favour with market-gardeners near London because, on rich land, it takes so little time to come on—often only six weeks between sowing and clearing—that by good management several crops can be grown in a summer. The genius who could invent a machine for washing which would reduce the cost by a fraction of a penny would deserve honour if he did not make money.

Setting aside the distinguished practitioners who carry on their operations under glass, and who may be styled the aristocracy of the profession, the growers of market vegetables may be divided into two classes: those who alternate vegetable crops with corn and agricultural roots, and those who practise intensive cultivation and devote themselves exclusively to market-garden crops. As a rule the latter will be found in the zone near to the great centres of population, where land is dearer but markets nearer; and the former further out.

The crops grown by these will generally be those which require less cultivation, and can be handled easier in large quantities, such as Cabbage of different varieties, Peas, Beans, Marrows, Brussels Sprouts, Broccoli, Turnips, Carrots, Parsnips, and sometimes a few Lettuce and Onions; while the others will be found devoting their attention more to Lettuce and Cauliflowers that have been wintered under glass, Seakale and Asparagus both for forcing and not, Parsley, Mint, Onions for keeping, Spinach, Tomatos, and Marrows in frames. Natural Rhubarb, because of its weight, will not often be found growing at great distance from market. Celery requires peculiar facilities for irrigation, and its locality is regulated by the presence of these.

Asparagus, too, is a vegetable which flourishes most in certain favoured localities where soil or climate, or both, are specially suitable, as at Colchester, Wisbech, or Evesham, although a good deal is handled successfully in Surrey and Middlesex.

The long forced Rhubarb that came upon the market some few years ago and is now such a feature all the winter, and of which the legend was told that it was grown in disused coalmines, is now being grown round London in sheds specially constructed for it, and the London market for the Leeds grower is consequently becoming restricted.

The tendency of certain crops to become the speciality of particularly suitable localities is well instanced by the Onions and Parsley of Bedfordshire. Probably as much Parsley is grown in the neighbourhood of Sandy and Biggleswade as in the rest of England put together. I have met a grower near Sandy who claimed to have put 50 tons of Parsley on

rail at a time, chiefly for Scotland. There are, of course, the further instances of the Broccoli of Cornwall and the early Potatos of the Cheddar Valley, though in these perhaps climate has more to do with the association of crop and locality.

In thinking of market vegetables one's thoughts naturally run to that fearful and wonderful production, the seedsman's catalogue. How many nightmares has it been guilty of inflicting upon bewildered market-gardeners, when it arrives at the opening of the year, with its "novelties," "select strains," and "proved specialities," flanked by superlative testimonials, and supported in reserve by lifelike photographs! In the catalogue before me there are 116 different varieties of Peas named, 29 varieties of Beet, 60 varieties of Lettuce, excluding subdivisions. Of course, like your hotel wine list, all are distinct, all are in stock, and no fortifying is resorted to. It is a peculiar thing that certain varieties of a vegetable will sell on one market and not upon another. As an instance, the Maltese Cabbage Lettuce is a favourite in the Midlands, where the seed is sold, I am told, by the hundredweight, but in London this variety is unsaleable, being regarded as too coarse; the smaller and more compact varieties, such as 'All the Year Round,' 'Vauxhall Defiance,' 'Trocadéro,' or 'Chavigny,' being preferred by the dainty appetites to be catered for in the metropolis.

A word may be said here about the inordinate rage for size. Why, for instance, a gross, coarse, giant head of Celery with leaf-stems that eat like rope yarn should be preferred to a crisp, nutty, fine-flavoured one, but small, is difficult to understand; or why a Parsnip which must be cut before being cooked should be selected for its size, which must often mean coarseness, is also a mystery. Are the flavour and quality of a bud of Asparagus always in equal proportion to its size? Yet "best," in market terminology, always means largest. The Londoner *does* seem to know that a big Radish is pithy, and wisely prefers it culled when small, and similarly he does not value a Beetroot for its size and close alliance to the Mangold Wurzel, but selects those of best colour and fineness of texture. In nothing among vegetables is this rage for size more remarkable than in the Cos Lettuce. Large Cos Lettuces are always in demand. No matter how hearty, clean, and well-grown a Cos Lettuce may be, if it is not large it is not wanted while large ones are to be had, even if they are a bit tough, over-ripe, or slack. Large Lettuces have been selling this summer at 1*s.* 6*d.* a dozen when smaller ones could with difficulty be disposed of at 6*d.* the score of 22. And yet who ever saw a Cos Lettuce sent to table whole? In the case of the Tomato (which, by the way, is, I suppose, strictly not a vegetable) the demand for fruit of even moderate size comes not from the consumer but from the retailer, who finds that with large Tomatos it is so difficult to get exact pounds weight that he frequently has to give over-weight, the practice not being in vogue of charging for the additional ounce as it is among butchers.

There are some vegetables which will probably never obtain a permanent place upon the list of English market vegetables, owing to the precarious nature of the English summer weather. During the few dry, hot, and sunny summers we enjoyed previously to last year, the corn-cobs of Maize and the fruit of the purple Egg-plant, called by the French

"Aubergines," were seen upon the stands of some London market-gardeners, and their cultivation, together with that of the outdoor Tomato, bid fare to extend; but the last two sombre seasons, that have done duty for summer, have made growers realise that to speculate in such crops is very much in the nature of a gamble. In the matter of Endive, English growers never seem to be able to keep pace with their Continental competitors, our climate seems to give it such a tendency to bolt; nor does it bleach so readily with us. Is it because our seedsmen are always dependent upon seed grown on the Continent, and have not succeeded in raising a variety suited to our more humid and variable climate?

To the Mushroom much patient attention has been devoted of late years. Once it was the most uncertain crop a man could put his hand to. Men obtained good crops and hardly knew why they had, and again failed when they thought they had taken every means to secure success. Now it is not too much to say that, after patient study and careful tabulation of results, the growth of this favourite fungus has been reduced to an exact science, and certain growers find no crop so easy to make sure of.

Nothing has been said about the Potato, that autocrat of the middle-class dinner-table. It would demand separate treatment to deal with properly. Its adaptation to cultivation in large breadths where labour is not over-plentiful, and its dislike to highly manured soil, have very much taken it out of the hands of the market-gardener, and given it over to the farmer, whom in many districts it has saved from the necessity of answering the question, "Does corn-growing pay?"

This rapid and very cursory review of vegetables for market leads to the reflection that while enterprise, skill, and study have done much to improve the character, increase the variety, and develop upon right lines the cultivation of vegetables, much more remains to be done. Some that are useful and acceptable upon our tables, but will not stand the rigours of our climate, may yet, by careful selection and judicious crossing, be led to develop the necessary hardihood and vigour, just as in Florida it is claimed that they have developed a hardy Orange.

There are many openings for the ingenious to invent labour-saving appliances. Someone has constructed a machine for grading oranges and wrapping them each in a piece of paper, and it is said the machine can be adapted to fruit of any size. Is it past the wit of man to invent a machine that will bind Radishes or wash the bunches? On some German farms, electricity generated at waterfalls is being used for ploughing and hauling. What developments await the application of this wonderful and mysterious form of energy to the growing of vegetables for market? The industry without doubt is of importance, both from the point of view of public health, and also on account of the large amount of labour it employs, to say nothing of the increased rent land used for market-gardening is privileged to earn for its owner. With the continual growth of population (which we have come now to look upon as a certainty) home-grown vegetables cannot recede in importance, whether the whirligig of politics brings us a change in "fiscal" policy or no. Yet the market-gardener remains the agricultural pariah: "Abraham knoweth us not, and Israel doth not acknowledge us." The Central Chambers of Agriculture have no

time to spare from the consideration of cattle diseases, barbed-wire fencing, pure beer, and protection, to notice such insignificant items as fruit and vegetable growing. The Department of Agriculture does not seem to be able to make up its mind whether "market-gardener" is a term which really represents a distinct calling or whether (to parody the description of a Transatlantic importation in fruit) it does not represent the derogation of a farmer and the prostitution of a horticulturist. This is scarcely to be wondered at, however, when a great society, which shall be nameless here, fails to provide a single class in its schedule wherein at any of its shows the market-gardeners can compete among themselves, and some demonstration be afforded the public of how the fruits and vegetables they get from their fruiterer and greengrocer are sent to market. Doubtless the same public is more interested in the manner in which the fruit and vegetable world supply their quota to the *menu* of the millionaire and aristocrat.

Reverting once more to market accommodation, the grower who sends his goods to any London market and sells them himself has still (as his predecessors centuries ago had to do) to sell his goods upon uncovered stands, exposed to all the weathers that come. He cannot avail himself of such modern things as the telephone upon the market; he can have no security in his market tenancy, nor any goodwill; and while obliged to transact his business in the small hours of the morning, he must put up with what apology for light he can get.

THE COOKING OF VEGETABLES.

By Dr. Bonavia, F.R.H.S.

I think it will perhaps be best if I first give some reasons why, in modern times, it is an advantage to devote more attention to the Art of Cookery than was the case in former days in the United Kingdom.

In times gone by, the very justly famous "roast beef of Old England" required only so much art in the cook as to ensure its being done "to a turn," for when so treated it was the choicest, the most delicious, and the most satisfying kind of food one could possibly obtain in civilised life. This beautiful article of olden times required neither sauces nor any form of condiment to make it palatable. When nicely roasted, its own exquisite juice and its own streaky fatness, with the addition of an honest Potato, were all that was required to make it a repast fit to place before a king. It is possible that such a delicious viand is still to be met with at the banquets of the Lord Mayor of London, and other such like feasts to which persons of distinction may be invited. This superb roast beef was perhaps even more exquisite when eaten cold next day.

But what is the case now, at all events, where ordinary mortals are concerned? I shall briefly give my own experience. On one occasion I was staying for some time in a London boarding-house. The roast beef the residents got was the most tasteless I had ever eaten. It was imported frozen beef one day, and imported frozen mutton the next. Then came Christmas, and the landlady was inspired to give her boarders, as a very great treat, a joint of "prize beef," from one of the oxen exhibited at the Islington Show. It was veritably a "great treat;" for a bit of the famous "roast beef of Old England" had for once made its appearance again on the table. In Worthing, as in most places also, nothing but invasion beef and mutton can be had; at one Christmas, however, a butcher rashly undertook to show us what "prize beef" was like, and so I had an opportunity once more of obtaining a piece of the "old article," and truly delicious it was. Unfortunately, the butcher never repeated the experiment.

The fact is, it does not pay breeders and butchers to supply first-class beef or mutton in competition with the shiploads of frozen meat that come from various quarters. In the *Standard* of May 5, 1903, it is stated that in 1870 imported beef and mutton were in proportion of 7 lbs. per head of the whole population; now it is 34 lbs. per head. Imports have lowered prices and profits, in some years perhaps to well-nigh vanishing point.

How they managed matters 300 years ago is more than one can tell. Mr. Harrison Weir, in 'Our Poultry,' p. 279, says that 300 years ago, in London, the best pig or goose could be had for sixpence, a capon for threepence, and a chicken for one penny. In France they have a fowl—the "poularde"—which is the most exquisitely flavoured bird, when properly cooked, that I have ever tasted. Nothing like it is to be had in this

country. That also requires neither sauce nor condiment of any sort to make it palatable, for simply roasted it is a unique enjoyment. But both the French "poularde" and the English first-class beef are expensive, and therefore out of the reach of persons living on ordinary incomes. A vast majority of people live on small incomes, and have to make a virtue of necessity. They try to persuade themselves that imported frozen meat is, after all, very nice. I have never found it so. The Italians have their "agnello Pasquale," which would correspond to "sucking lamb." That, too, requires no disguise; it is one of the most delicious meats, when simply roasted, that I have ever come across.

Someone may perhaps ask, Is this a paper on the "cooking of vegetables"? Yes! and my object in writing the foregoing lines is to impress upon the reader the necessity of devoting more attention to the art of cookery, now that shiploads of comparatively inferior and flavourless meats are imported. These meats may be nourishing enough, for all I know; but, besides the need of nourishment, the invitation to eat the nourishing thing is very important, for to eat a thing *with pleasure* is a great aid to digestion. I know that many people like these foreign meats; but I know also that many people like that abomination called "chicory" mixed with their coffee, as if they drank coffee for the sake of its brown colour, instead of for its aroma and its stimulating effect on the brain. They have become so habituated to this particular adulteration that now they think it very nice, and would rather have it in their coffee than not. Indeed, they often get more chicory than coffee! So it is with these flavourless foreign meats. The habit of pretending to like them makes people end by really liking them. Mr. Peter Barr, in writing to the 'Gardeners' Chronicle' from South Africa, says: "The frozen meat should be far superior to what is at present put on the table." He had a piece of steak put before him that a knife could not cut, or his teeth masticate, and had to give it up as a bad job. He adds that "if a man wants to travel he must not be particular on the score of food, or he had better stay at home," where he would not usually be better off, for either beef or mutton!

After this preamble let me say something about the cooking of vegetables.

In a former paper (published in this JOURNAL of the R.H.S., Vol. xxii., p. 55) I wrote something about the cooking of vegetables; I shall therefore not repeat the recipes therein included.*

I do not think there are many vegetables which have a very distinct flavour; and the English mode of cooking them (by boiling) washes out of them any little flavour they may have originally possessed. Cauliflowers, Peas, Asparagus, Globe Artichokes, and Jerusalem Artichokes have each a distinct flavour, and would require little art to make them palatable; but Brussels Sprouts, Turnips, Carrots, Vegetable Marrow, Pumpkins, French Beans, Broad Beans, Knol Kohl, Cabbage, and Potatos can all be much improved by certain modes of cooking, either with certain sauces, or with various meats or fish, besides certain condiments.

* Dr. Bonavia's previous article contained recipes for cooking Aubergines, Cabbage, Cauliflower, Onions, Salsify, Parsnips, Vegetable Marrows, Gourds, Peas, Knol Kohl, Tomatos, and Potatos.

The Potato is now the national vegetable; few people, high or low, think of sitting down to dinner without Potatos in some form. Potatos should be boiled in their skins, as otherwise the boiling water will wash out their flavour. They can be served in their "jackets," or peeled after boiling, and kept warm till served. When a joint of beef, mutton, or pork, or a fowl is baked, a good way of cooking Potatos is this:—Peel as many Potatos as you require; cut them in halves lengthways, and arrange them, cut side downwards, in a baking-dish; over each put a dab of lard or dripping and some pepper and salt; pour into the dish a small cupful of water or stock, place the joint or fowl over the cut Potatos, and bake the whole.

There are two ways of cooking Potatos which are very nice.

(*a*) Peel a number of raw Potatos; cut them into slices of about half an inch thick; cut the slices again into bars of similar thickness and fry them of a golden colour in plenty of boiling lard. There are not many things nicer than a grilled juicy mutton chop (if you can get it!) served with Potatos, fried as above, and piping hot.

(*b*) Boil the Potatos in their skins; peel and slice them crossways; then toss them in a frying-pan with plenty of butter, finely chopped Parsley, and a couple of spoonfuls of good stock, previously thickened with a little flour, pepper, and salt, and a squeeze of lemon-juice. The French call a somewhat similar dish *maître d'hôtel* Potatos. To be served very hot with meat or fried fish.

There is an Irish dish made with Potatos and Cabbage which, if properly made, is extremely nice. It is called "Kale-cannon," and is made thus: Steam some floury Potatos in their skins; put them through a squeezer; then steam some small and choice Cabbage and squeeze out its water in a piece of muslin and chop it up finely. Put a good bit of butter in a saucepan, add the Potatos and the Cabbage, half a teacupful of cream, and some salt. Stir up the whole on the fire so as to amalgamate the ingredients thoroughly, and serve hot, to be eaten with meat; or you can turn the whole into a buttered pudding-dish, dust the top with Parmesan cheese, and bake in a hot oven till the surface acquires a nice brown colour, and serve as second course.

One should have some notion of making sauces to add to cooked vegetables. There are two sauces which should be handy for culinary purposes in order to give flavour to flavourless though nourishing viands, and both can practically be made out of the same materials. Continental chefs are formidably extravagant in making their foundation stock for sauces. In an Italian cookery book before me entitled "Il Re de' Cuochi" (The King of Cooks), large pieces of beef and veal and a fowl are boiled down with several ingredients for making a stock of first-class consistency to be used as a foundation for all sorts of sauces. But a fair foundation for sauces can be made as follows: Prepare a couple of sheep's trotters chopped in pieces, some bits of ham and bacon; any left fowl or game bones, and a pound of steak cut in small pieces; then cut up an Onion and fry it brown in butter in a saucepan, add all the above prepared meats, and in addition half a Carrot and half a Turnip sliced, a clove of Garlic, a couple of bay-leaves, and some parsley-leaves; cover the whole with good ordinary stock, and bring it to a boil; skim the surface of

grease, and let the whole simmer for two hours. Then strain it through a hair sieve. This may be called *sauce-stock*, or a foundation for a number of sauces. You can thicken it with flour and a little milk; you can add to it a *purée* of Tomatos, or of Turnips, or Carrots, or Celery, and call it by the name of the flavouring vegetable; and you can give it a distinct flavour by adding a little of any of the numerous bottled sauces sold by grocers; a little sugar, or lemon-juice, or any of the spices will also give it a distinct flavour. In some suitable cases half a wineglass of Marsala will give the sauce an agreeable flavour.

A person who has, in his or her brain, the cooking instinct, will be able to invent a number of sauces at pleasure; the thing to be kept always in mind is to obtain an enjoyable flavour of which the diners may be able to say "How nice!" If the meat used for the sauce is browned in a saucepan with butter, and some burnt sugar colouring is added, you can make a *brown sauce*; if these are omitted you can make a *white sauce*. Butter and cream or the beaten yolk of an egg added, off the fire, if properly blended, will improve all sauces. All these things, however, are matters of taste, and can be left to the fancy of the person in charge of the kitchen operations.

This paper is intended only to give a few hints of the ways in which vegetables can be cooked, in order to make a little appetising variety from the plain boiled. I think a capital way of utilising vegetables for food—more especially those which have not a decided flavour of their own—is by the process called *au gratin*, in which grated cheese enters as a principal ingredient. The name *au gratin* would appear to mean "browned in an oven;" or, as the Italians would say, "browned with fire beneath and above;" or again, as we should say in India, "browned in a Dutch oven, which has fire below and above."* I give here recipes for a few vegetables cooked in this way; then the cook can substitute any other vegetable in season, and make any other variations in flavour by a judicious use of spices and grocer's sauces. The cook should be allowed to try this mode of cooking, so that he or she may regulate any modification according to the impression that the dish may make on his or her brain through the gustatory nerves. The cook should also utilise any criticisms which the diners may make. The object is to make a dish palatable to all who may have to eat it.

Sprouting Broccoli au gratin.—Select a number of small Sprouts, about 3 inches long; wash and steam them till tender; when cool, place a layer of them in a buttered pudding-dish; pour over them some thickened white sauce, dust them with pepper and salt and some grated cheese (a mixture of Parmesan and Gruyère); add another layer of Sprouts, and repeat the ingredients, and so on until the dish is full. Finish it by pouring some melted butter and spreading a layer of cheese over the whole. Bake in a hot oven till the surface is nicely browned. To be served as a second course.

Jerusalem Artichokes au gratin.—These are very nice worked up thus: Peel and steam some Jerusalem Artichokes (this tuber takes a good deal of cooking to make it tender throughout). When done, let them cool;

* The French verb *gratiner* means "to bake brown," but the phrase "au gratin" we should have translated literally "covered with raspings of crust of bread."—Ed.

make up a sauce out of some sauce stock, by blending with it some cream and the beaten yolk of an egg, some grated cheese, nutmeg, pepper, and salt; mix the Artichokes with it and turn the whole into a well-buttered pudding-dish, sprinkle over the surface a mixture of grated cheese and bread-crumbs, and bake in a hot oven till browned. Serve as a second course.

Pumpkin or Gourd au gratin.—The matured fruit of the Vegetable Marrow makes a capital substitute for Pumpkin. Take a portion of this, or of any other Pumpkin; cut off the hard skin and remove the seeds; cut it into cubes of one inch or so, and steam them till tender. Then arrange them in layers in a buttered dish, sprinkling grated cheese, melted butter, some brown sauce, pepper, salt, and nutmeg between the layers. Repeat the ingredients on the top, but be more liberal with the cheese. Brown in a hot oven, and serve as a second course.

Young Vegetable Marrows, the size of a medium-sized apple, steamed and cut up, and treated in this way, are excellent. A variation can be made by pouring on the top a purée of Tomatos, finishing with grated cheese, and baking as before.

A number of vegetables can be cooked in this way. For instance, small Brussels Sprouts, Cauliflower, Cabbage, nicely blanched Lettuce, Knol Kohl, Turnips, Parsnips, Carrots, Celery, Peas, tender French Beans. The Cauliflower, after having been steamed, should be divided into separate branches. The Cabbage, Lettuce, and Celery, after having been steamed, should be roughly cut into smaller portions; the Knol Kohl, Turnips, Parsnips, and Carrots should be young, and, after steaming, should be cut up into slices. Of course, the Peas do not require cutting up. A little chopped Onion fried in butter would give a nice flavour to the Peas, in addition to the other ingredients, not forgetting a sprinkling of sugar.

The seeds of overgrown French Beans, Scarlet Runners, &c., which the French call 'Flageolets,' can be turned to account as follows:—After shelling them, steam them till tender, and drain them. In a saucepan put some butter, some white sauce, a little good stock, chopped Parsley, pepper and salt; thicken them on the fire, add the Beans, and let the whole simmer for half an hour or so, then add a squeeze of lemon, and serve hot. They can also be cooked in a stone jam-jar with a screw top thus: Put a good bit of butter into the jar, add the shelled Beans, pepper and salt, half a teaspoonful of sugar and a tablespoonful of good sauce stock. Screw down the lid, and apply some paste over it, made of flour and water, well kneaded, to keep in the steam. Then plunge the jar in a saucepan with boiling water, and let it boil for two hours or so. Remove the lid, wrap a napkin round the jar, and hand it round on a plate, with a spoon for serving.

Peas cooked in the same way, with the addition of a good bit of fresh Mint, are excellent. It is a far better way than simply boiling them. All their fine flavour is retained, and the butter, sugar, and Mint make an exquisite addition. Once tried it will be probably often repeated in the Pea season.

Some other vegetables, such as small Brussels Sprouts, tender French Beans, Carrots and Turnips cut small, cooked in a jar as just described,

ought to be excellent. If only people would try experiments in cookery, the art might become a delightful pursuit.

There is a vegetable which is never seen in this country, and probably, if tried, it might be grown in the open as readily as Tomatos are grown, especially in the south-west of England and in the south and west of Ireland; I mean the pods of *Hibiscus esculentus*, an annual. In Madras this vegetable is called *Bándekai*; in Upper India it is called *Bhendi*; then in the West Indies, and in the Southern States of America, it is called *Okra*, written also *Ochra*, *Okro*, *Ochro*, and even *Gumbo*. I have been told that in some parts of the Mediterranean it goes by the name of *Bámia*. It must be a popular vegetable that is grown in so many places, and bears such a variety of names. It ought to be tried in the warmer parts of the British Isles,* and, as some may perhaps be tempted to try to grow it, I give some recipes for cooking it. When cooked the pods of this vegetable become very mucilaginous.

Take a dozen or more pods about two inches long, slice them cross-ways, and boil them in soup as one of the ingredients.

Take a number of pods about $1\frac{1}{2}$ inch long, wash them to remove any dust, dry them, and then fry them in butter, either whole or sliced, till they are nicely browned. To be eaten with meat dishes. If the pods of this vegetable are too old, they will become hard and unpalatable; on the plant, they will grow to the size of 3 inches or more.

Ochro au gratin.—Take a number of tender pods and let them be well steamed; drain and break them up with a fork, seeds and all; mix in some grated Parmesan, a tablespoonful of cream or milk, a beaten yolk of an egg, some pepper and salt; mix the whole together, and fill a small and well-buttered pudding-dish with it, dust the top well with Parmesan, and bake till the surface is slightly browned. To be served as a second course.

In this country, dishes of stewed vegetables, with the addition of beef or mutton or any other meat, are rarely made. It should be noted that meat gives a most appetising flavour to vegetables when the two are cooked *together*. The following is a fine recipe for such a dish, which goes under the name of 'Haricot:'—Take a sufficient quantity of sliced Carrots, Turnips, and Onions; fry each separately in lard; then fry the required number of lamb cutlets. When this is done stew the whole in some good stock, and use pepper and salt to taste. After the stew is brought to a boil, it should simmer, at a boiling heat, till the vegetables are quite done. If Peas and French Beans are in season, their addition to this stew would improve it, as also would small new Potatos, and a handful of sultana raisins. When served piping hot this stew should have a little gravy; so, when being cooked, the addition of a little more stock may be needed. Such mixed stews of vegetables and meat of any kind are common, and are the delight of country families on the Continent.

As the show at which this paper will be read is to be one of vegetables and fruit, I may perhaps add a recipe for cooking Bananas. Peel and cut in halves lengthways some not quite ripe Bananas; put them in a first-class batter; then lift them up one by one and fry them in lard as

* Seeds of it may be procured from the West Indies, under the name of *Ochro*; or from India, under the name of *Bhendi*.

fritters, adding a little of this batter to each fritter. Serve them hot, sprinkled all over with sugar. They should be fried to a golden brown.

As Tomatos are a fruit, I would end these recipes with one for making a first-class pickle out of green Tomatos. When Tomatos are grown in the open, in favourable seasons, there will remain in September a number of green fruits which cannot ripen owing to lack of sun and a sufficiently high temperature. These can be turned into a nice jam in the usual way, by slicing them and adding a certain amount of powdered ginger and lemon-juice. But a far better way of utilising them is to turn them into one of the finest pickles that I know. It is done as follows: Slice 5 lbs. of green Tomatos into an earthen or enamelled pan; sprinkle salt on each layer, and let them stand for twelve hours. Drain off the water and put the slices into an enamelled saucepan, pour over them one quart of white vinegar, $\frac{1}{2}$ lb. Demerara sugar, $\frac{1}{2}$ lb. sliced Onions (not Spanish), $\frac{1}{4}$ oz. each of cloves, bruised ginger-root, capsicum, and mustard seed, very little shallot and garlic; simmer the whole, with an occasional stir with a *wooden* spoon, until the Tomato is soft, and bottle. This is a royal pickle or chutney, and especially appetising when eaten with cold meat.

There is a notion with some folk that it is wrong to coax the appetite. But a little consideration will show us that to live at all we have to eat, and we have to eat a variety of things to supply our blood with all the ingredients which it must have in order to excite healthily the energy which our brain and spinal marrow have to give out so that we may successfully struggle for our very existence. Granted this, the sooner we understand that the more palatable we make a dish the more satisfactory is the impression conveyed to the brain by its gustatory feelers. This pleasing impression is reflected to the digestive apparatus, which then does its work contentedly, and we are saved a great deal of worry. Everybody knows how cheerful people are after having eaten a nicely cooked dinner, and how cross they are when the dinner is badly cooked and unpalatable. Crossness and anger are opposed to healthy digestion. We should all think it strange if anyone were to tell us that it is more creditable to enjoy horrible sights and scenes than pleasant ones; bad odours than agreeable scents; a bad German band than a fine orchestra; to lie down on thistles and nettles than on a comfortable bed! All these things to our educated minds would appear preposterous, but when we come to sensations of the palate many people hesitate and think that we are not justified in liking nicely made and palatable dishes, rather than simply boiled and tasteless vegetables. If we are to eat vegetables at all, common sense would suggest that we use materials and processes to make them as pleasant to the palate as we can.

I happened to mention to a lady friend that I was writing a paper on the cooking of vegetables. She laughed and said, "Nobody will take the trouble to follow your recipes." I dare say there is a great deal of truth in that statement; but was there ever anything done, worth doing, without trouble? Let us examine for a moment what sort of dinners a large number of families have week after week, *without trouble*. The following bills of fare were given to me by a lady of experience:—

First day, usually a Saturday, they have a joint, frozen meat of course, with some vegetables; followed by stewed rhubarb or prunes.

Second day, some of the joint is eaten cold, with perhaps a suet pudding or a tart. This sort of diet may be continued for *two or three days*.

On the *fifth day*, if any meat is left, it is made into a "resurrection" hash, which is one of the most tasteless preparations that can be made out of tasteless frozen meat. This hash is followed by boiled rice and treacle.

These are specimens of cookery *without much trouble*. A Continental person would, however, probably say they look very much like prison diet! Yet, with a little trouble, and even an elementary knowledge of cookery, the same tasteless meat and tasteless boiled vegetables might be transformed into palatable and appetising dishes, that would cheer and comfort anybody who partook of them.

There are many vegetarian restaurants in London, and several vegetarian cookery books have been published, so that there can be little difficulty in acquiring sufficient knowledge to enable one to cook an appetising dish of vegetables. "Yes, but it requires *so much* trouble!"

In conclusion, it is well known that an appetising dish is very conducive to easy digestion, and, considering the tastelessness and therefore uninviting features of these imported meats, it becomes of some importance, in the cooking of vegetables, to present them to the palate in a more inviting way than those which accompany prison diet.

VEGETABLES FOR EXHIBITION.

By Edwin Beckett, F.R.H.S.

Evidence is not wanting that a keener interest is being manifested in the cultivation of vegetables for exhibition than has been the case for some years past. There must be some very good reason for this altered condition of affairs, and this should not be difficult to find. There is little doubt that the representation of high-class produce at the leading exhibitions throughout the country is mainly responsible for the change, and one only need observe the interest taken in the different competitions by visitors to the shows to be convinced of the good work that is going on.

A change for the better has taken place, and in this connection it is interesting to note that the old ideas regarding size have been superseded by a knowledge of what is best in the different subjects in which quality is now rightly considered of first importance. While these thoughts are now generally regarded as the embodiment of all that is correct, there must not be a too hasty decision in determining the merits of the different subjects in so far as size in itself is considered. High quality in many vegetables is not determined by mere size in any one of them, yet there are those which undoubtedly demand this essential as of first importance. It is much to be regretted that opinions vary so much on this question, and until a generally recognised standard has been set up it seems hopeless even to expect that satisfactory progress will be made.

The Royal Horticultural Society, as becomes its exalted position, is the one authority to take this matter in hand, and among its large and comprehensive list of experts in vegetable culture it should be an easy task to call into existence a committee, capable of settling the question once for all, so that a uniform standard of quality might be recognised. I am surprised to find that there are many still under the impression that vegetables grown for exhibition purposes are of little use for the table, and to dispel such ideas a proper definition of what is quality or excellence in vegetables seems to be very necessary. The different subjects vary so much in their character that each one should, by itself, be clearly and unmistakably defined. By some such method it should be possible to arrive at conclusions most helpful to those who desire to cultivate vegetables at their best, and by this means also settle a much-vexed question.

It is most unfortunate that for some time past experienced cultivators have held views so diverse. Because of this unsatisfactory state of affairs, positions have often been reversed when an exhibitor has shown in two distinct parts of the country, and this is a fact that every thoughtful person must deplore.

We have now arrived at a very important period in the history of the cultivation of vegetables for exhibition, and the present occasion appears to be a fitting opportunity for ascertaining what should be done to attain

the ends all truly interested most heartily desire. When once proper lines are laid down on which judges should work, the adjudication of vegetables possessing high quality should be a simpler matter than it is to-day. Uniformity in judging is absolutely essential if success is to be achieved, and the best quality in the different subjects also is to be represented.

At the present time the point we want to discuss is, how far size should govern quality. It is an easy matter to go to the extreme in both directions, and this again emphasises the need there is for a full and proper consideration of the points of quality in each individual subject. There is little merit in developing very large and coarse specimens of any vegetable, and badly finished ones offer the same objection. The standard I have always set myself to follow is the production of vegetables that are equally well adapted for table use and exhibition purposes, and in the attainment of my ideal I maintain that high quality cannot fail to be achieved. I have never advocated the production of vegetables that are not suitable for table use, and, whenever I have been called upon to adjudicate, preference has always been given to exhibits in which excellence of culture and high quality have been represented. As an instance take two of our most useful and common vegetables, the Potato and the Cabbage. When staged large and coarse, neither of them is so good or profitable as medium-sized well-finished specimens, no matter whether it be for home use or for commercial purposes. I always hold that in making awards the varieties staged should most certainly be taken into consideration. My reason for this recognition of the different varieties in this way is that many of the handsomest ones have little or no value when cooked, and all will agree that such should be discouraged. This action is more important when adjudicating upon the relative merits of such subjects as Potatos, Tomatos, Peas, and Turnips, in which a pleasing appearance is often misleading.

While I deprecate coarseness in size, there are a limited number of vegetables which represent the highest culture when extended to their utmost, but in such instances finish of the very best must also be attained. As an instance take the Onion. Large, heavy, well-ripened bulbs, perfect in every respect, in which the best varieties are displayed in typical form and condition, are invaluable for many purposes in the kitchen, and these are certainly examples of high culture and equally high quality.

The large-podded Peas are infinitely to be preferred to the smaller varieties, as they are usually well filled and of good colour; their flavour, too, is invariably of the best. The same remarks apply with fully equal force to the French and Runner Beans, each of which now show wonderful advancement over the old small-podded varieties; the leading varieties of to-day totally eclipsing those which found favour in earlier days. I am firmly convinced that Celery of high quality cannot be grown too large, no matter whether it be for eating in a raw state or for culinary purposes. Well-grown, properly blanched, and perfectly clean examples partake of a flavour which is not nearly so pronounced in smaller specimens. As I have already briefly mentioned, Potatos are too often shown much larger than is desirable, and many good-looking, though worthless varieties are encouraged, through want of a keener

discrimination, by thoughtless judges. Clean and even tubers of medium size are the great desiderata, and the varieties should be admittedly of the best cooking qualities.

The Cauliflower is a subject regarding which opinions of its quality are very diverse. At all seasons of the year this fine vegetable should be represented by heads of medium size, firm and perfect in shape, and remarkable for the purity of their colour. Large and coarse heads should be rigidly discouraged, as their want of quality renders them of little value for table use. Cabbages, both red and white, and the Savoys come within the same rule, and huge specimens should not be encouraged.

Root crops should be represented by specimens of medium size and good colour. Beetroots of large size are useless for exhibition and worthless for cooking. The same may be said of Carrots and Parsnips; colour in the first-named subject being an essential consideration. Their chief points, however, lie in their shape and colour. Clean and tender Turnips of medium size represent quality of the best.

Leeks are exhibited in diverse character, chiefly owing to the want of a generally recognised standard of quality. There are judges who regard a long blanched stem very highly, while others have a decided preference for specimens of great girth but of medium length. While opinions are so opposed one to the other it is most unsatisfactory. I consider a typical Leek should have a circumference of about six inches, and be blanched to the extent of about twelve inches, more or less. There should be no sign of "bulbing" apparent, and they should be even throughout. This subject is a splendid test of a vegetable-grower's ability, and few vegetables demand more care and attention to be represented in proper form and condition.

Notwithstanding all that has been written to the contrary, it cannot be denied that Cucumbers are too frequently exhibited far too large. A good grower would select fruit of a medium size, fresh and well finished, and the variety should be one bearing a good reputation. And regarding Vegetable Marrows these remarks apply with equal force. Avoid the large coarse ones, giving preference to those of newer and improved forms, as for table use they are incomparably superior.

Tomatos are an invaluable unit in all collections of vegetables. The general feeling regarding them is that they should be of medium size, but it much depends on the variety. Perfectly finished specimens, even supposing they be of good size and even weight, are to be preferred to all others, and as a rule their flesh and flavour too are much better. Smooth-skinned ones of good colour are excellent for exhibition and represent the highest quality. There are some very good smooth-skinned golden varieties also of excellent quality.

Mushrooms in a representative collection are telling, and these should be absolutely fresh, even, and of medium size.

To achieve results of the kind just given in considerable detail, the highest culture is absolutely necessary. Seldom is it possible to produce vegetables of high quality unless the ground has been properly prepared, and much careful thought and attention given to details of the work beforehand. Premier awards in the leading competitions are not gained with garden produce grown in haphazard fashion. As a matter of fact,

every detail is carefully studied; and, most important of all, the character of the ground to be cultivated requires to be thoroughly understood. A rough plan of the garden should always be made, and the space allocated to each subject clearly indicated thereon. It is imperative that no plot of ground be cropped two years in succession with the same subject, Onions, however, being the one exception to this apparently rigid rule. A change of soil is very necessary, and the wisdom of this changing about of quarters is generally seen in subsequent crops. Referring again to Onions, the same quarter may be used for many years with the best results. As to the best time to trench and dig, opinions are somewhat diverse. Whether this should be done in autumn, winter, or spring, individual circumstances must determine. When dealing with light soils the work should be done quite early in the autumn, and the sooner the trenching is completed the better. In the case of soils of heavier texture the work should be deferred till the end of February or March, taking the precaution, however, in the early autumn to break up the surface with a fork. Left thus all through the winter, better drainage of the soil will be encouraged, and being in the rough, frosts will pulverise and sweeten it. I have no sympathy with those who simply dig their ground in an ordinary manner; trenching is essential to success, and in its observance deep culture follows as a consequence. It may be argued that time cannot be spared for trenching in many establishments, but this difficulty may be overcome by adopting a better system of carrying out the work of the garden. In the cultivation of vegetables for exhibition, deep culture is one of the chief factors in achieving success, and for this reason the work should be done in a thorough manner.

Contrary to the usual practice of keeping the bottom spit at the bottom, I advocate bringing it to the surface. The weather then does its beneficent work of sweetening the soil, rendering it fertile, and with surface dressings of other soils, which ultimately become incorporated with it, the whole, instead of part of the soil, is brought into fertility. To the depth of two-and-a-half to three feet should trenching be done, and the bottom should also be well broken up. For deep-rooting subjects such as Peas and Beans, Onions, &c. two layers of manure should be applied. At the bottom of the trench place a layer of the larger and greener manure and any garden refuse, such as leaves and litter, of which there is always an accumulation. The second layer of manure, and this should be partially decayed, and road-scrapings (invaluable for heavy ground), should be placed about midway between the surface and the bottom of the trench. Ample space should be allowed, so that these operations may be carried out thoroughly and expeditiously. The surface soil should not be broken up finely, but left in the rough for the weather and frosts to do what is necessary. Previous to planting, the surface should be forked over when the soil should crumble, being rendered friable by these means.

Root crops such as Carrots, Parsnips, Beetroot, and Salsify should follow in ground that has been previously occupied with Celery. Soil of this kind has been deeply worked and purified. Even in these instances, I desire to emphasise again the need for trenching, incorporating soot, burnt garden refuse, road-scrapings, and old mortar refuse. Soil destitute

of lime would be benefited by a dressing of this invaluable material. Distribute these ingredients evenly over the ground, digging in these fertilisers a week or so previous to the work being carried out.

Assuming we have cultivated our vegetables satisfactorily, the question of the selection of the best specimens requires a great amount of patience and overlooking of the different crops. Some time before the date of an exhibition an enthusiastic grower of high-quality vegetables will have noted the more promising specimens of the different subjects in their beds and quarters. In addition to the mental notes made, he will find it an immense advantage to mark many of the best specimens with sticks, and in this way save much valuable time when pressure is greatest. Cauliflowers should be inspected daily, and effectually protected from the light by a covering of fresh leaves. Slugs and caterpillars are always a source of anxiety with this crop, as they quickly cause a blemish ; for this reason they should be searched for and exterminated. It will be necessary in some instances to pull the Cauliflowers, in which case they should be hung, head downwards, in a cool shed or cellar. To Lettuces, Cabbages, and all members of the *Brassica* family the foregoing remarks also apply. Root crops such as Potatos, Carrots, Beetroot, &c. should be dug beforehand and the selected specimens packed away in sand or fine soil in a cool place. Parsnips should not be dug up till the day previous to an exhibition, or much of their freshness will be lost.

Referring again to size, too much importance should not be placed on specimens of mere size. Potatos, Carrots, Beetroot, Cabbages, Cauliflowers, and Cucumbers should be of medium size, and, if possible, faultless in quality. The case is different, however, with Onions, Leeks, Celery, Peas and Beans, and Tomatos, as size should be regarded with favour, provided the specimens are perfect in other respects. It is important, too, to pay special attention to the question of variety. The cleansing of the selected specimens demands more attention than it usually receives. The root should not be roughly handled ; on the contrary, it should be treated with the utmost care. When washing them it is fatal to use a scrubbing-brush, as the inexperienced frequently do to their cost. Three tubs of water and some good pieces of sponge are alone requisite : one tub for soaking the specimens, another for washing, and a third for giving the final rinsing—the water in the latter being quite clean. From roots of the character of Parsnips, Carrots, Beet, and Turnips, all small rootlets should be removed with a sharp knife, and each root as it is finished laid on clean mats and kept covered until packed.

Medium-sized oblong hampers are best for conveying produce to and from an exhibition. The grower should also provide himself with a number of small boxes in which to pack separately such vegetables as Tomatos, Peas, Beans, Brussels Sprouts, and similar subjects, and each box should be labelled, to avoid confusion when packing and unpacking. The best packing material is fine wood-wool, and this should be used quite freely. Each root should be wrapped separately in white tissue-paper, and these should be packed next to the boxes in the bottom of the hamper. On these in turn carefully arrange Leeks, Onions, Beans, Cauliflowers, and other subjects of similar character. Cucumbers should

be packed in narrow wooden boxes about three inches deep; the greatest care must be exercised in this matter. An abundant supply of fresh green curled Parsley is always required for garnishing, and this should be well washed, tied in bunches, and packed in between the more tender vegetables. Labels, with the names neatly and legibly written thereon, should be prepared the day before the show, and placed in an envelope in the hamper when the packing is completed.

To stage a collection of vegetables in a really satisfactory manner, at least three hours should be allowed for the work to be done. Although the quality of an exhibit, both as regards individual dishes and the collection as a whole, is of primary importance, a great deal depends upon the setting up of the display, when the competition is very keen. A most attractive picture may be created when the proper disposition of the different subjects is thoroughly understood, and to obtain this knowledge experience, based upon good advice, is undoubtedly the best teacher.

It is necessary in the first instance to decide the method of arrangement, and the following suggestions may be helpful to the inexperienced in these matters:—Cauliflowers or Broccoli should be included in all collections, and a triangular arrangement of a given number of heads should be set up at the back of the group, in the centre. As each individual subject is completed, cover it up with clean white tissue-paper before proceeding with the next one. Neatly garnish with Parsley, taking care not to unduly cover up the specimens. Label with care, and at the last moment remove the papers and see that you have conformed to the conditions of the competition. The number of specimens to make up a dish &c. should always be carefully checked, as failure to observe this simple rule has not infrequently lost exhibitors good prizes. In this connection, too, I desire to emphasise the need for uniformity in this matter. Too often, the number of specimens to complete a dish or unit in a collection of vegetables is not specified in the schedules, and in consequence there is absence of uniformity in the displays. In fairness to the judges as well as to the exhibitor, the number of specimens required should in each instance be distinctly specified.* By these means the work of adjudication is simplified, and exhibitors compete on an equal footing. In addition to Cauliflower and Broccoli, which should be included in all collections of vegetables, there should also be represented, if possible, Potatos, Carrots, Tomatos, and Onions, these subjects being regarded as essential. Others, when in season, are Peas, Globe Artichokes, Brussels Sprouts, Celery, Leeks, French or Runner Beans, Turnips, Asparagus, Beetroot, Cucumbers, and Vegetable Marrows.

Having satisfied ourselves as to what should be represented in a collection of vegetables at different seasons, it may be as well to briefly refer to the best types of the respective subjects.

Peas.—There are many very excellent varieties in cultivation, but the best for early shows is undoubtedly 'Edwin Beckett'; for second early, 'Alderman'; and the two best late ones are 'Gladstone' and 'Autocrat.'

French Beans.—So-called improved varieties are constantly added to the lists, but for good all-round quality 'Canadian Wonder' still takes the first place.

* They will be found in the R.H.S. "Rules for Judging."

Runner Beans.—There is undeniable improvement in this vegetable, and the variety I most highly regard for exhibition is 'Ne Plus Ultra.'

Beet.—This is a valuable dish in any collection, and of the many varieties of good repute, 'Pragnell's Exhibition' and 'Dell's Crimson' are special favourites.

Broccoli.—For late autumn and early spring displays, Broccoli forms a good substitute for Cauliflower, and should be in all collections when the latter cannot be had. 'Model,' for early spring shows, represents good quality.

Brussels Sprouts.—These are exhibited either growing on the stems or as detached sprouts to the number of fifty. The latter method is preferable. Solid medium-sized buttons of good colour should be selected. 'Cambridge Champion' and 'May's Northaw' are two good and reliable varieties.

Cabbages.—Three heads of medium size, conical in shape, firm, of good colour, and without a blemish, represent an excellent type of this highly prized vegetable. 'Ellam's Early' is reliable, and is of ideal size too.

Carrots.—Apart from its culinary value, the Carrot is a most attractive adjunct to any collection. 'Model' is a splendid variety for early shows, and for mid-season and late exhibitions it is not possible to improve upon a good strain of 'New Red Intermediate.'

Cauliflower.—Of all vegetables, this is the one which is held in highest esteem, and rightly so. Medium-sized, pearly white, fresh heads should always be selected. There is no better variety for early shows than 'Early Forcing'; 'Walcheren' for mid-season displays; and for autumn exhibitions the unsurpassed 'Autumn Giant' is the most satisfactory.

Celery.—This is an excellent test of a vegetable-grower's skill, and, when represented in good form and condition, is a telling unit in late summer and autumn exhibitions. Specimens should be large and solid, perfectly blanched, and quite free from all blemishes. For early displays 'Early Gem' has much to recommend it, while for the later shows 'Superb White' is the best of the white varieties, and 'Standard-bearer,' the best and most consistent of the Reds.

Cucumbers.—These, when well-grown, are invaluable. There are a large number of approved varieties, but 'Ideal' is difficult to surpass. Specimens should be symmetrical in shape, with short ends, and the bloom should not be rubbed in the slightest degree. A perfect brace should be as nearly alike as possible.

Leeks.—These should be staged with all the rootlets possible, taking care, however, to remove unsightly ones. Specimens should be blanched to the extent of about twelve inches or more, and in girth should be some six inches. 'The Lyon' is an excellent type.

Lettuces.—A perfect Lettuce should be of large size, heavy and solid, and equal to the test of cutting, which is invariably done with the Cos varieties. A good type of Cos Lettuce is 'Superb White Cos.'

Onions.—For exhibition these should be large, with small necks, of good shape, and thoroughly ripened. A good strain of 'Ailsa Craig,' which ought to be of globular form, is without a doubt the best type of

Onion extant. 'White Leviathan' commends itself as a variety for autumn sowing.

Parsnips.—Another subject for autumn displays, at which season a collection of vegetables would be incomplete without them. The specimens should be of medium size, long, and tapering from the crown to the tip of the roots. The skin should be clear and white, and free from coarseness or canker. 'Tender and True' is a splendid representation of high quality.

Tomatos.—A necessary adjunct to every collection. Medium-sized fruits are preferred to unduly large ones, and their shape and colour should be good, with smoothness of skin and small eye. Uniformity of size is much to be desired. 'Polegate' is a capital Red, and 'Golden Jubilee' an equally good Yellow variety.

Turnips.—In some seasons this is a subject of importance for exhibitions. The roots should not be large, but rather of medium size, with perfectly clear skin and small taproot. The rind should be quite tender. An all-round good variety is 'Early Snowball.'

Vegetable Marrows.—For shows held in May, June, and early July, this is a subject much in request. The fruits should be of even and medium size, of good shape and free from the slightest blemish, and exhibited with the remains of the flower on them. It is essential, of course, that they should be fresh-looking and the rind quite tender. In place of the coarse varieties, much too freely grown, the finely flavoured 'Pen-y-byd' is recommended.

Potatos.—No collection of vegetables can be considered complete without the inclusion of a dish of Potatos. Varieties are about endless, each claiming some special advantage. For early shows, it is not possible to improve upon 'Duke of York'; and for later displays the round 'Windsor Castle' is indispensable. Exhibition Potatos should be of medium size, shallow-eyed, free from scabs or cracks, skin quite clear, white, but not necessarily smooth, for roughness of skin generally denotes good cooking qualities, and this point should always be considered by the judges.

ON THE PRODUCTIVITY OF SEEDS.

By F. J. Baker, A.R.C.Sc., F.R.H.S.

When we examine a sample of seed we can easily determine whether it has been well matured and well harvested ; we can, with but little trouble, determine its percentage of germination ; in many instances we can decide, with probable accuracy, the strain as well the variety which we are viewing. But beyond these matters there are hidden influences in the seed which we cannot determine by the closest inspection. The inherent properties of the protoplasm, for the time being dormant, endow the seed with powers of which we may little think. To-day we rightly value pedigree influence. We know that by cross-fertilisation, and hybridisation, followed by rigid selection, we have succeeded in obtaining very many desirable plants.

Few persons now will dispute the great advantages of heavy well-matured seeds, as compared with badly-developed ones, and generally it is admitted that a change of seed gives increased vigour, and consequent partial freedom from disease.

These matters are of paramount importance, but in addition to them there are minor details which, collectively, make considerable difference to the productivity of our plants. One or two of these minor points were forcibly brought before my notice by an experience with Potatos and Peas. Fresh from examination triumphs in agricultural science, I thought to surprise my neighbours with enormous crops. I arranged to grow Potatos largely. A dozen or so varieties were grown. Several of these, especially the newer ones, were very successful, although grown on very poor land, but 'Beauties,' and particularly 'Snowdrops,' were terrible failures.

Nineteen hundredweight of 'Snowdrops' were planted, cultivated, and manured, according to the most approved theoretical formula. The seed had been obtained from first-rate growers and from good land. The entire crop of 'Snowdrops' was 13 cwt. After such a failure, the growth of these varieties was of course discontinued, but the stock was sent to various remote districts. The result was surprising. One grower wrote the following season to say that the 1 cwt. of 'Snowdrops' had yielded an extraordinary crop of fine tubers, with which he had obtained six first and two second prizes at various shows !

In the same season that the Potatos were grown, I grew, under contract, between six and seven acres of 'William Hurst' Peas, for seed ; 24 bushels were sown. The ground, which was a very poor chalky bank, was manured solely with mineral manures. One of the worst crops I have seen harvested was the result, but the few bushels obtained were very fine seed. Two or three quarts of these were left behind and sown in my own garden for private use. Planted in really good soil, a *very* fine yield resulted. In this case the district was the same ; probably the results

would have been even better, if it be possible, had the second sowing been on good soil at a distance.*

These failures, which naturally one is too apt to ignore, stood out prominently in my mind among many successes, and the reason was asked. I remembered, as a lad, my innate love of gardening induced me to endeavour to get better results than anyone else, and with this object to obtain the newest and best strains of seeds. Among other items, a new variety of Radish was obtained, the best specimens grown were carefully selected, seed saved and sown. Some of this seed, sown on very poor soil, produced plants which were not particularly good; the best were selected and allowed to seed, chiefly because the ground, being poor, was not needed. I have always thought, with pride, that the finest Radishes I ever grew were those obtained from the seed thus produced, although, until lately, no reason could be given for the result.

With these *facts* before me, I have endeavoured to investigate the matter, and at the same time the cognate subject of the productivity of plants raised from new and old seeds respectively. We are well aware that many seeds retain their vitality for a number of years, but I was surprised to be told, by a very successful cultivator, that he much preferred *old* Cabbage seed, as the plants are stronger and less liable to club. How far this latter opinion is correct I cannot say, but my experience with old seed of good class, *which had been well matured*, has been very satisfactory, *if sown early* and sown as thick as a previous germinative test showed to be requisite. Several times have I obtained these results with the Brassicas; and have also had fair success with seeds such as Beet, Parsnips, and others of which it is usually said new seed is essential. The seed must, however, be thoroughly well preserved, and even then a great number will lose their vitality. To give two specific instances: In the autumn of 1901 I had a large quantity of Mangold-wurzel seed of a good strain, which should have been sown the previous season. This was stored and, in January, tested. About one third germinated; the development was, however, very slow, even at a somewhat higher temperature than would have been normal for the soil at the growing season. Consequently a large quantity was soaked, in order to facilitate germination. It was sown three weeks earlier than the ordinary season. Notwithstanding the soaking, growth was so very slow, that I feared a serious mistake had been made, and some new seed was obtained and sown. This new seed germinated rapidly and was quickly in advance of the older. I quoted the result in several lectures to show the superiority of new seed, but after a few weeks an unfavourable climate had terribly retarded the growth of the plants from the new seed, while those from the old went steadily—very steadily at first—but continuously on, and in the end were *very* greatly superior to those raised from the new seed.

Parsnip seed, we say, should certainly be new, and I have known several failures arising from using old seed, sown at the ordinary time, and the same quantity per given area as new. At the present moment (October 1903), I have a nice lot of Parsnips, the seed from which they

* See note: "Experiments for Commercial Purposes," Report of Scientific Committee, Nov. 24, 1903.

were grown having been produced in 1900 and sown just before Christmas 1902. *Some* of the unsown old seed still retains its vitality, but it takes a long time to germinate.

These and several other somewhat similar observations and experiments have inclined me to think that *seed* grown on a poor soil, where lime, phosphates, potash, and other minerals abound, but *comparatively poor in nitrogen*, or even in nitrogenous humic matter, will be likely to be more vigorous than that produced on rich soil. The *quantity* of seed produced will almost certainly be greatly *de*creased. But the seed thus produced, especially when it has been kept a considerable time, is likely, in my opinion, to be of great use *as a stock-getter*.

Consider, very briefly, the usual methods of seed production. Our larger seedsmen (who should be considered as among the very best friends of the horticultural public) are always on the look-out for a really good new variety or strain. This, when obtained, is selected at great cost, with what care the ordinary cultivator often little imagines. Having got a fair stock of the strain, as true to type as practicable, the owner often arranges with various farmers to grow by contract a certain number of acres for seed : the seedsman supplying the stock, the cultivator undertaking all necessary operations. The seedsman, however, usually takes the precaution to send out an expert to supplement the farmer's possibly imperfect "roguing" (elimination of all not true to type) and to ensure its being done at the proper time. In the case of Peas the usual contract price is from 54*s*. to 80*s*. a quarter, of 8 bushels, the amount of seed supplied being first deducted from the quantity returned, and the seedsman paying all carriage expenses. These contracts are usually the best-paying items of the arable-land farmer, and there is always a competition for them. It is obvious, then, that a farmer, having obtained a contract to grow *so many acres* of seed at an agreed price a bushel or a quarter, will sow the stock seed on the *best* soil available. It happens that *most* garden soils are in better condition than the majority of farm soils, and hence the advantage of such seeds ; but, in my opinion, even better results *might* be obtained if the poorer soils were used. However, it is a matter for consideration, as the price of the seeds would necessarily be increased, the yield being so very much less. In many instances the very small yield would certainly not pay expenses.

What, then, do we suggest ? Remembering the great advances made in obtaining desirable, vigorous plants by cross-fertilisation and hybridisation, and the rigid selection now made by seedsmen, we are of opinion that to these all-important methods may be added the minor, but nevertheless important, details of infusing increased vigour into strains of long-recognised merit, which have become more or less enfeebled by *continuous growth under similar conditions*.

What is true of plants commonly raised from seed is emphatically true of those which, like the Potato, are propagated by vegetative parts : that is, a continuation, by division, of the life of an individual plant. We all know how the various varieties of Potatos become enfeebled, and ultimately have to give place to newer strains. The results first mentioned appear to indicate that the period of utility might be lengthened if a few selected tubers were planted on a suitable poor soil, for the

purpose of raising stock for the succeeding year. Whether this is practicable or not can only be determined by careful experiment.

However, arising from these results are suggestions of *very great importance*. In order to obtain new varieties of the greatest vigour, we require healthy vigorous parents, whether such are destined to be pollen-producers or seed-bearers. We know that several valuable acquisitions have been obtained by infusing, through pollination, the vigour and characters of allied wild plants, themselves useless, into those already in cultivation. It is worth consideration and determination by experiment how far we can obtain, for future stocks, *parents* of *vigorous constitution*, by carefully weeding out all but the very best. To do this, in my opinion, we should not only make a rigid selection of the very best specimens, but these should be planted on poor soil as indicated, and further some of the seeds kept so long that many have lost vitality—the remaining few being likely to be the best, especially to obtain plants for use by the hybridist. It is generally known that, when obtaining new varieties, the seeds which take longest to germinate are likely to produce the most valuable plants. All who have an interest in vegetable seed production should give at least a little thought to the minor points here raised; and, ever open to conviction in the search for scientific truths, *endeavour* to ascertain by actual experiment how far these things are practical facts.

VITIS ARMATA
VEITCHII

HARDY ORNAMENTAL VINES.

By James H. Veitch, F.L.S.

From the standpoint of the gardener no genus is more important than the genus *Vitis*; no plant more commonly softens the hardness of castle or cottage wall throughout the temperate zone than one of its species, *Vitis inconstans*, erroneously known as *Ampelopsis Veitchii*, the celebrated 'Boston Ivy' of New England.

From the earliest times and in every country, wherever the Grape Vine, *Vitis vinifera*, would thrive, it has been cultivated with care, the fruit being to other fruits what wheat is to other cereals, the most important in Western eyes, as rice is in Eastern.

On the merits and history of *Vitis vinifera* there is no need to dwell here—the subject has been fully dealt with by many; but there are a great number of other species worthy of the closest attention from their elegant contour, bold foliage, autumn tints, remarkable rapidity of growth, and their power of attachment to almost any object within reach.

It is difficult to conceive a difference of opinion on the ornamental value of many species of *Vitis* when grown either on stout poles, pergolas, or old trees, or when encouraged to ramble over walls and fences.

The 250 or more known species are usually found in the woods of the warmer parts of both hemispheres, more especially in the East Indies. None are indigenous to Europe. The Grape Vine, *Vitis vinifera*, the companion of civilised man in all parts, is now held to be a native of the shores of the Caspian Sea, south of the Caucasus Mountains, where it luxuriates, but too great faith may not be attached to this. *Vitis inconstans* (*Ampelopsis Veitchii*) is rare in Japan, its native country, and luxuriates in other lands.

The homes of those hardy species with which we in England are most interested are, with one or two exceptions, the United States of America, and in the East, China and Japan. Of these the second edition of the "Hand List of Trees and Shrubs cultivated in the Royal Gardens, Kew," published in 1902, enumerates forty-three species and fourteen varieties as being at that time in cultivation, but that number has now been considerably added to by the introduction of several really remarkable types from the mountainous regions of Central China.

The treasures of this vast region have only within comparatively recent years been brought to notice by Père David and other French missionaries, and more recently still by Dr. Henry and Mr. E. H. Wilson, whose efforts have been crowned with great success. Amongst the mass of material Mr. Wilson sent home are several Vines of the highest value, referred to in the following pages.

As at present constituted the genus *Vitis* includes *Ampelopsis* and *Cissus*, which were formerly kept separate owing to slight technical

distinctions in their floral structure, now considered insufficient to warrant their separation. The distinctions given by Loudon are :—

Vitis	Style wanting	Petals 5
Ampelopsis	Style present	Petals 5
Cissus	Style present	Petals 4

Commencing with the American species, the best and most widely known, I will briefly refer to those most suitable for planting in this country, and then touch on the Chinese and Japanese species, more fully describing several recently introduced, and quite new to cultivation.

The fact that many of the species are dicœcious (the male and female flowers being on separate plants) has not infrequently led to botanists describing the different sexes of one species under separate names, and some species have as many as six and seven synonyms. Light is now beginning to break on this confusion, and the names given here have been carefully verified and may at this date be taken as reasonably correct.

Vitis æstivalis, the 'Summer Grape,' is found in the United States from New England to Florida. The leaves, covered with a reddish down when young, which is lost as they become mature, measure some 6 inches in diameter, and are of a deep green colour, with purple leaf-stalks. The fruit, of a pleasant but rather acid flavour, is dark blue, ripening in October.

Vitis arborea, also known as *Cissus bipinnata*, inhabits the southern United States from Florida to Georgia, and is said by Loudon, who figured it in his "Encyclopædia of Trees and Shrubs," to have been introduced to this country in 1700. The leaves are bipinnate and resemble those of *Tecoma* in appearance and size. It is of slow growth in Great Britain.

Vitis cordifolia, or the 'Chicken Grape,' is also a United States species, with heart-shaped leaves 3 to 6 inches in diameter, often slightly three-lobed, of thin texture and smooth, on both surfaces. The berries are nearly black when mature, about $\frac{1}{4}$ inch in diameter, and of acid flavour.

Vitis californica is a strong grower, reaching the highest points of the tallest trees in its forest home, the leaves in autumn assuming a deep crimson hue. It inhabits Central and South California and North Oregon, and is one of the best of the Californian natives for this country.

Vitis Labrusca, the 'Fox' or 'Skunk' Grape, is a very attractive North American species, said to be the parent form from which most of the American cultivated Grapes originated. The leaves are roundish, heart-shaped in outline, variously incised or cut into lobes, with sinuate serrate margins. The upper surface is green, with the principal veins purple; the petioles, under-surface, and young wood being covered with a rusty woolly tomentum. This species is evidently also wild in China, and has been recently raised from seed collected by Mr. Wilson.

Vitis quinquefolia (*Ampelopsis hederacea*), or the 'Virginian Creeper,' is a well-known species, said by Loudon to have been introduced from North America to this country in 1629, and is one of the commonest plants in cultivation. It is an excellent subject for towns, withstanding

FIG. 83.—VITIS ARMATA.

FIG. 84.—VITIS ARMATA, VAR. VEITCHII.

Growing at Coombe Wood, Surrey.

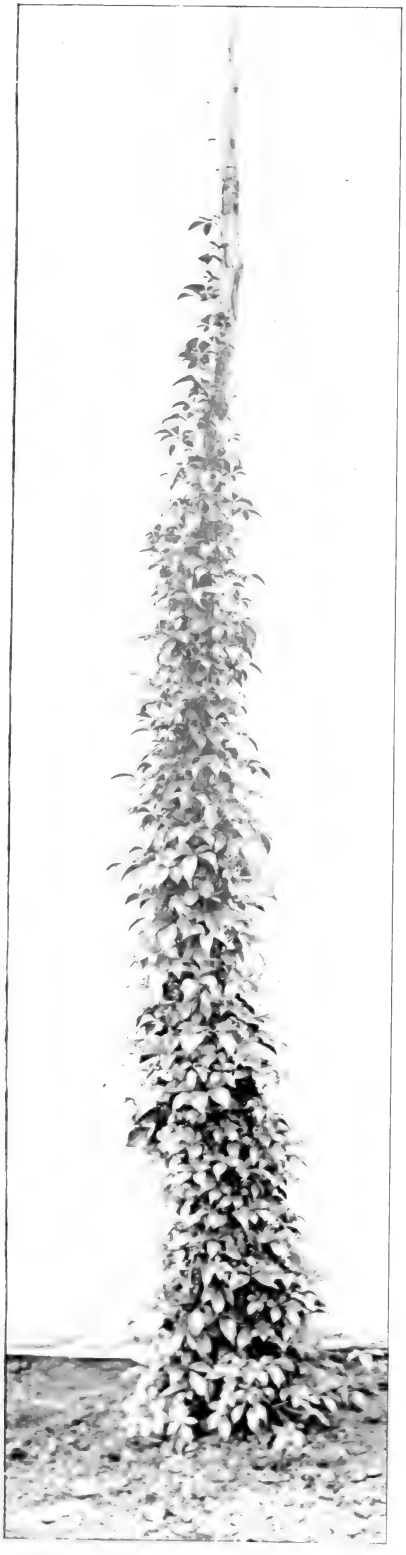


Fig. 85. Vitis Thomsoni.

Fig. 86.—Vitis megaphylla.

Growing at Coombe Wood, Surrey.

Fig. 87.—Vitis aconitifolia.
Spray, 15½ inches in width.

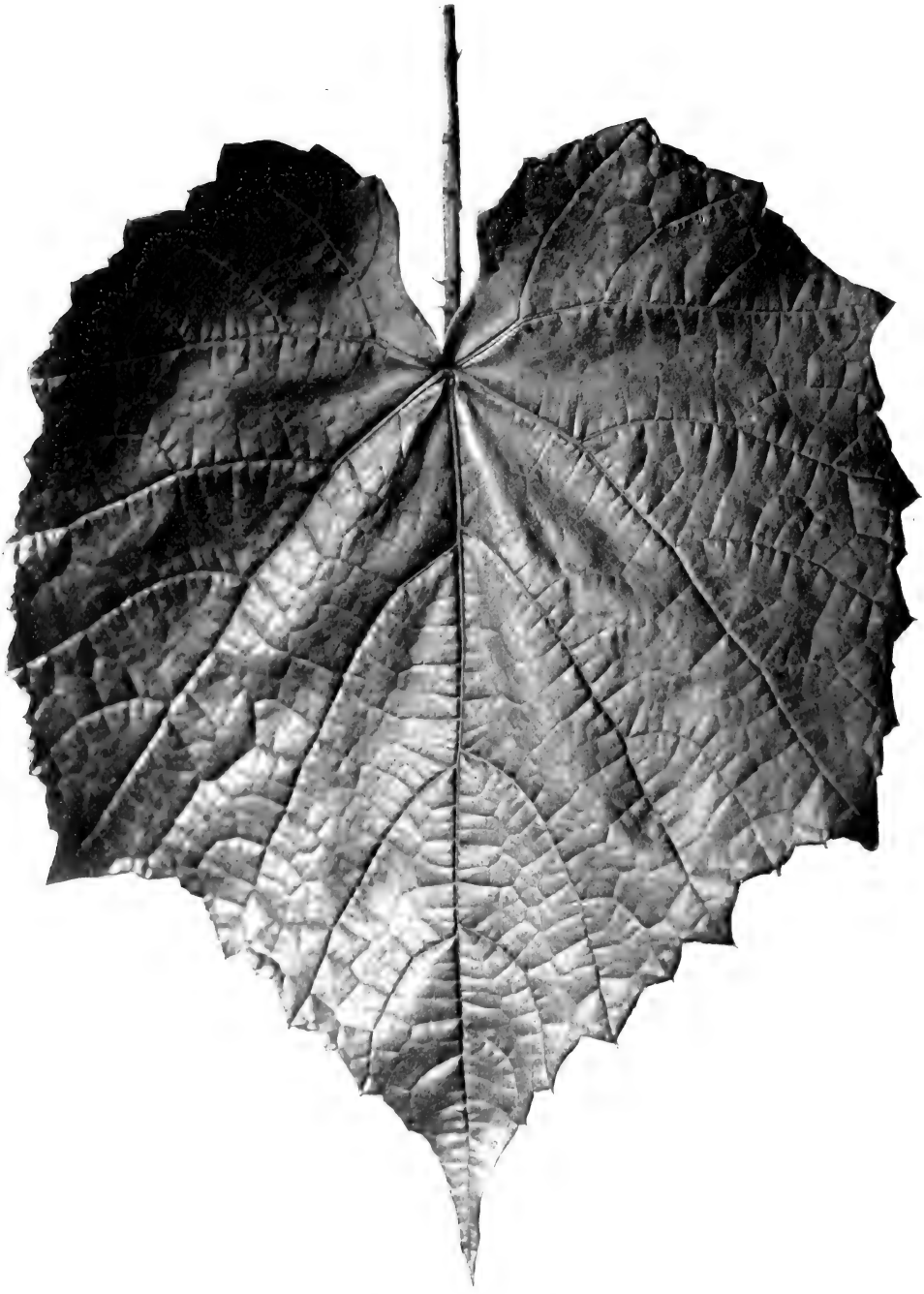


Fig. 88. Vitis armata.
Length, 7½ inches; width, 6½ inches.

both the dry atmosphere and dust of cities, and no plant is more suitable for covering arbours, trellises, verandahs, &c., or for producing in so short a time such wealth of foliage.

The well-known rich hues of crimson, scarlet, and purple which the leaves of this species assume before they fall in the autumn, are amongst the most brilliant of any in the group, and no description is needed of such a well-known plant, except, perhaps, to draw attention to some of its varieties, which differ from the type in the few particulars indicated by their varietal names. These are *hirsuta*, hairy on both surfaces of the leaves, which do not colour so well as those of the type; *incisa*, with more deeply cut leaves; *major*, a large-leaved form; and *muralis*, a self-clinging or wall-loving form, of exceptional beauty. The last named was formerly considered a species, and known as *Ampelopsis Engelmanni*, under which name it is still grown in the United States. It differs from the other forms of Virginian Creeper in being self-supporting, firmly clinging to walls by sucker-like tendrils, and in developing even more brilliant tints in autumn.

Vitis riparia (*odoratissima*), or, as it is now called, *Vitis vulpina*, is the 'Riverside Grape' of North America, and is one with various forms, to which at different times specific names have been applied. The *Vitis odoratissima* of Don is the male plant of this species. It is figured in the "Botanical Magazine," t. 2429, where it is stated that the female forms are seldom found north of the Potomac river, though the males extend far beyond it. (A similar phenomenon is mentioned regarding the Hop, the males of which are found in many hedgerows, but the females are seldom seen except in cultivation.) This species is remarkable for the delightful fragrance of its flowers, resembling the perfume of Mignonette. The leaves are slightly three-lobed, with unequal serratures, smooth on the upper surface, but the lower, although more shining than the upper, is filled between the veins with a very fine greenish tomentum, and is hairy along the principal veins, petioles, and margins.

Amongst other North American species in cultivation are *Vitis cinerea*, the 'Sweet-water Grape,' a greyish-green leaved species; *Vitis arizonica*, the 'Cañon Grape' of Arizona; *Vitis candicans*, the 'Mustang Grape' of Eastern Texas; but those described in more detail are the best adapted for general planting in this country.

The list of Japanese and Chinese Vines, which has of late been considerably increased by new introductions from China, contains species which are well adapted for cultivation in the gardens of this country. Found in mountainous regions of considerable elevations, they are perfectly hardy, and at Coombe Wood, in Surrey, they have withstood severe frosts.

Amongst them are found the largest-leaved as well as the smallest-leaved known species of the genus. The noble *Vitis Coignetiæ* and the still finer *Vitis Thunbergii* may be taken as examples of the former, and *Vitis inconstans* (*Ampelopsis Veitchii*) and the new *Vitis flexuosa Wilsoni* (fig. 90) are instances of the latter.

Between these extremes may be found others with most variable leaves, differing much in colour, size, and shape, from the glossy bronzy-green of *Vitis armata Veitchii* (figs. 84, 89, and coloured plate) to the rich purple of

Vitis Thomsoni (figs. 85, 100), and the pretty white and rose variegation of *Vitis Henryana* (fig. 92).

The autumn tints assumed by the Eastern Vines hitherto in cultivation are of the most brilliant hues, and a well-coloured column of *Vitis Thunbergii* or *Vitis Coignetiæ* is a garden picture which leaves a lasting impression on the mind.

Of the colouring properties of the new species from China it is as yet early to speak definitely in all cases; but, though the last two summers have been dull and wet, they promise to be no wit inferior to those of the Vines we already have. From information of their behaviour in their native ranges there is reason to assume they will rival the best of the older varieties in the matter of autumn tints, and *Vitis Thomsoni*, *Vitis armata Veitchii*, *Vitis flexuosa Wilsoni*, *Vitis Romaneti*, and *Vitis sinensis* have assumed at Coombe Wood autumn tints which leave little to be desired.

Vitis aconitifolia is a new Chinese species with leaves of variable form, but usually dissected into five narrow pointed leaflets, resembling those of the Monkshood or *Aconitum* (fig. 87).

On the upper part of the plant the leaves are usually digitately compound, composed of from three to five leaflets, slightly hairy on the upper surface, more densely so beneath, purplish in colour when young, and when mature of a bright green with a velvety appearance. The leaflets vary in breadth and in outline, and the margins are more or less serrate.

As a pillar plant this species has a very light and graceful appearance, and it will probably be largely planted in situations that are not suited to the more robust and vigorous varieties. It was first shown in a group of new Chinese Vines on September 1, 1903, and received an award of merit.

Vitis amurensis, a native of North China and Amurland, is a large-leaved species with foliage somewhat resembling that of *Vitis Coignetiæ*. It does not succeed equally well in all localities, but in a strong soil and in a sheltered position, where it makes vigorous growth, the autumn colour is said to be an intense crimson of a very vivid tint.

Vitis armata, also recently introduced from Central China, is, and probably ever will be, one of the most remarkable and handsome of the ornamental Vines. The stems and petioles are thickly beset with prickles, from which peculiarity it derives its specific name. In the 'Gardeners' Chronicle' for 1886, p. 753, Mr. Hemsley gives an account of a specimen of thorny Vine which had come under his notice in a small collection of dried plants from the neighbourhood of Ningpo, sent to England by Consul Cooper in 1884. The specimens were imperfect, and were accompanied by the following note: "Thorny Vine, cultivated at Kinhua; bears large purple grapes."

The leaves bore a resemblance to *Vitis vinifera*, and to this species it was referred by Professor Oliver, under the name *Vitis vinifera* var.? In 1885 it was figured in the 'Revue Horticole,' at page 55, fig. 10, as *Spinovitis Davidii*, and was described by M. Carrière from specimens collected in the mountains of the western province of Shensi by Abbé David. This is now in cultivation at Kew under the name of *Vitis vinifera* var. *Davidii*.

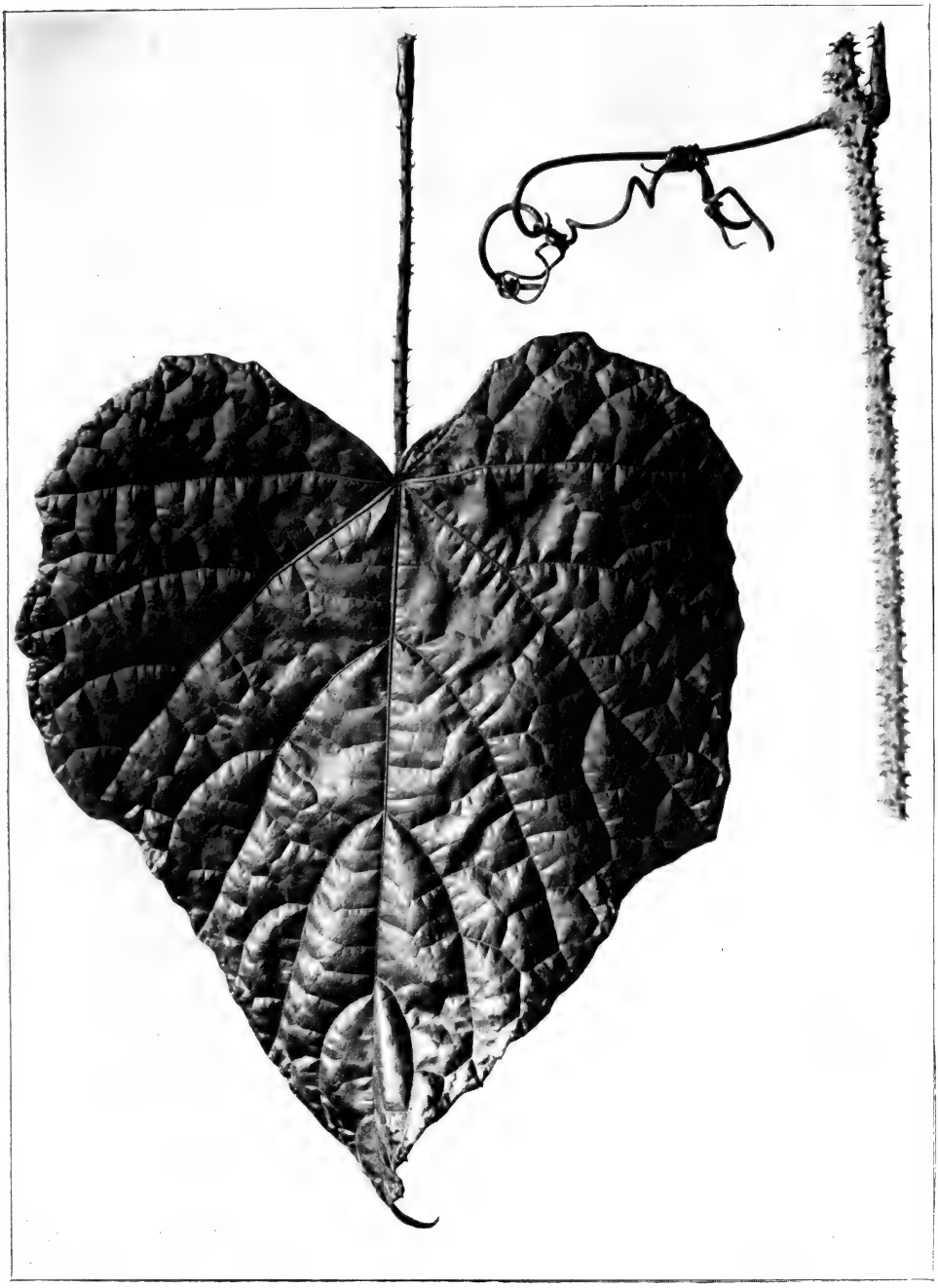


FIG. 89.—VITISARMATA, VAR. VEITCHII.
Length, $9\frac{1}{2}$ inches; width, $7\frac{1}{2}$ inches.

FIG. 90.—VITIS FLEXUOSA, VAR. WILSONI.
Length, $3\frac{1}{2}$ inches; width, $2\frac{3}{4}$ inches.

FIG. 91.—VITIS SP. No. 491.
Length, $5\frac{1}{2}$ inches; width, $5\frac{1}{4}$ inches.

FIG. 92.—VITIS HENRYANA.
Length, $4\frac{1}{4}$ inches; width, 5 inches.

FIG. 93.—VITIS SP. No. 396.
Length, $5\frac{3}{4}$ inches; width, $4\frac{1}{2}$ inches.

FIG. 94.—VITIS SP. No. 383.
Length, 6 inches; width, $4\frac{1}{2}$ inches.

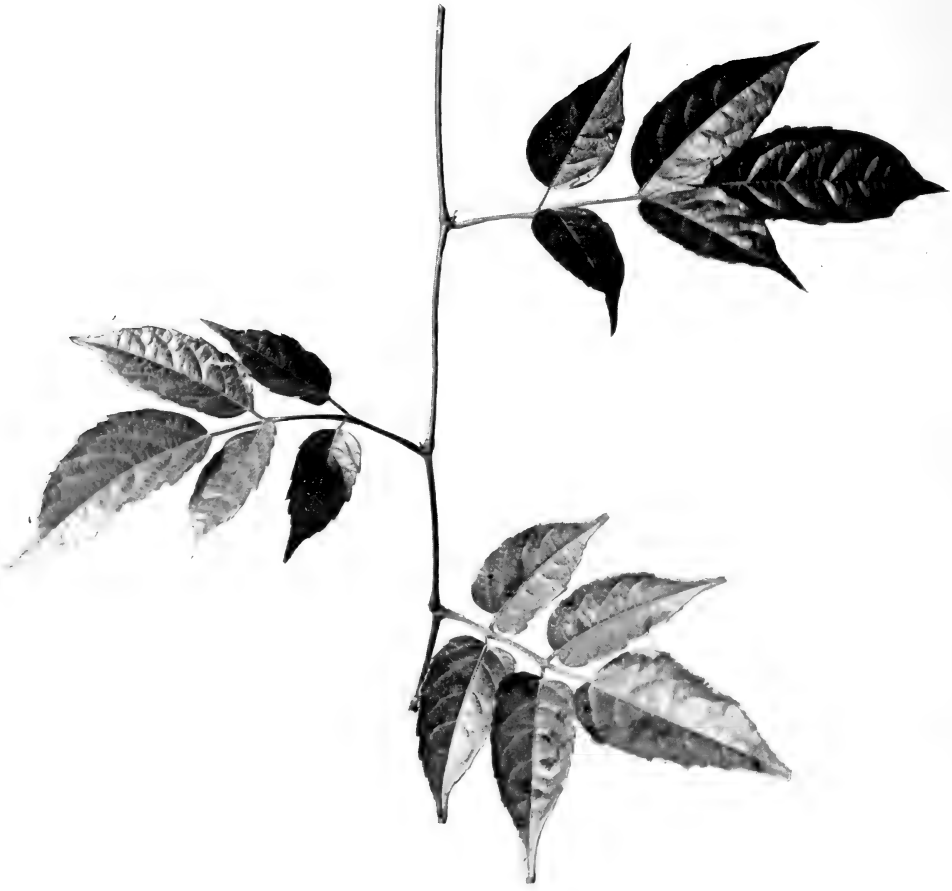


Fig. 95.—Vitis leeoides.
Spray, 17 inches in width.

Vitis armata, which was sent by Mr. Wilson from the province of Hupeh, Central China, resembles the above in having the prickles and edible fruit, but is a far handsomer plant (figs. 83, 88, 104). At Coombe Wood, in Surrey, plants two or three years old from seed have developed into striking specimens, 6 to 10 feet high, furnished from the base upwards with large simple leaves of a bronzy-green hue when young, the stems and petioles being covered with peculiar processes similar in appearance to thorns or prickles, but which can hardly be called by these terms as they are commonly understood. The leaves are heart-shaped, 7 to 8 inches broad, and 9 to 10 inches long, sometimes three-angled, and glabrous in all parts. The petiole is about 6 inches long, purple in colour, and densely beset with semi-transparent green tubercules, which are often bent in the form of hooks, and no doubt assist the plants in their native habitat to climb trees or scramble over underwood. As to the value of the fruit in this country it is at present early to speak, but in all probability it will not be great.

Mr. Wilson says of the fruit, in his notes :—"Edible and of pleasant flavour, but rather sharp." Dried specimens show that it is of fair size for a fruit unimproved by cultivation.

A form of *Vitis armata* has appeared in the collection at Coombe Wood to which the varietal named *Veitchii* has been given. This form is unusually bold and handsome, more vigorous than the type, producing larger leaves which retain a shining bronzy-green colour all through the summer, and in autumn assume the richest hues (figs. 84, 89).

Vitis Coignetiæ is a native of the forests of Yesso, Japan, and was for many years a puzzle to botanists of this country who failed to recognise it, although there is now little doubt as to its identity. In its native forests it climbs to the tops of the highest trees, or rambles for long distances in apparently aimless confusion through the undergrowth on the margins of woods, bearing everywhere its enormous foliage, which in autumn assumes the most brilliant and startling hues of red, crimson, and golden-yellow. The leaves are thick and leathery in texture, often 9 to 10 inches long and equally broad, rich green above, and covered with a soft woolly tomentum beneath. This Vine is a strong and vigorous grower, and is best planted in situations where it is free from restraint and can ramble at will.

Vitis Delavayi, another new introduction from China, of distinct appearance, is named after the French missionary, Père Delavay (fig. 102). It is a trifoliate-leaved species, the terminal leaflet being the largest, measuring fully six inches in length when fully developed, lanceolate in outline, and coarsely serrate. The other two leaflets are irregular in outline, and the halves on either side of the midrib are unequal. The petiole and stems are purplish in colour and glabrous.

Vitis flexuosa is a small-leaved species, a native of China and Japan, with flexuous stems and cordate serrate leaves that are villous on the lower surface, and in some seasons retained till the middle of November.

Vitis flexuosa chinensis is distinct from the other forms of this most variable species, differing from *V. flexuosa Wilsoni* (described below), in having larger leaves of a less glossy appearance (fig. 107).

Vitis flexuosa major is a large-leaved and striking form of the above

species. It forms a handsome plant, with leaves from 7 to 8 inches in length, and 9 to 10 inches in breadth, simple or more or less trilobed, with coarsely serrate margins and villous under-surface. When young the shoots and leaves are crimson, assuming, as they develop, a glossy bronzy-green with a purple under-surface, and when mature a deep green. The autumn colours of this variety, blackish-purple and blood-red, are unusually distinct and beautiful.

Vitis flexuosa Wilsoni, a new and peculiarly attractive form of the species, has recently been introduced from Central China, and named after the young and now well-known traveller. The leaves are small, about 3 inches long by $2\frac{1}{2}$ inches broad when fully developed, and are remarkable for their deep bronzy-green hue and shining metallic lustre. The surfaces of the leaves are nearly glabrous, and the under-surface is coloured bright purple when young; the margins are serrate, the apex acuminate. It is one of the most distinct of the newly-introduced Chinese Vines, and, from its neat foliage and compact habit, will be valuable for situations where the larger-growing species cannot be employed (fig. 90). This variety was included in a group of new Vines exhibited at the Drill Hall on September 1, 1903, when it received recognition from the Floral Committee.

Vitis heterophylla is, as its specific name implies, a variable-leaved species, several forms of which are in cultivation. They differ from the type in the lobing or variegation of the leaves as indicated by the varietal names, *dissecta*, *humulifolia* (Hop-leaved), and *variegata*, by which they are known (fig. 101).

The type, a native of China, Japan and Corea, is conspicuous in autumn from its bright red stems and peculiar pale blue berries. The leaves of *Vitis heterophylla* are scarcely lobed at all, those of *dissecta* and *humulifolia* are much cut, and those of *humulifolia variegata* are prettily variegated with white and rose-pink, with bright pink stems. The last-named form succeeds best in a warm sheltered position on a wall, or in a cool house, as it is not perfectly hardy.

Vitis Henryana is a very pretty Chinese species, named in compliment to Dr. Henry, by whom it was discovered. The leaves are digitate, composed of five lanceolate leaflets, which are variegated along the principal veins and midrib with silvery-white and rose on a dark green ground. The terminal leaflet is the largest, measuring about 3 inches in length by 1 inch in breadth, emarginate, and glabrous in all its parts.

This species is not such an aggressive grower as some, but is a very elegant and graceful plant, and the variegation of the leaves, which is of a natural and constant character, lends an additional charm (fig. 92).

Vitis inconstans (syn. *Ampelopsis Veitchii*, *Ampelopsis tricuspidata*, &c.). This Vine, familiar to botanists under seven or eight designations, and to gardeners by one or other of the names mentioned, is so well known that little need here be said of its merits. It was introduced to cultivation in this country by the late John Gould Veitch, who discovered it on Fusi-yama in Japan, on the occasion of the first ascent of that sacred mountain by Europeans. Another plant that was met with on the same occasion was *Lilium auratum* (the Golden-rayed Lily), and

FIG. 96.—VITIS LEEOIDES.
Length, $9\frac{1}{2}$ inches; width, $8\frac{3}{4}$ inches.

Fig. 97.—Vitis megaphylla.
Spray, 3 feet 5 inches in width.

Fig. 98.—Vitis Romaneti.
Length, $8\frac{3}{4}$ inches; width, 8 inches.

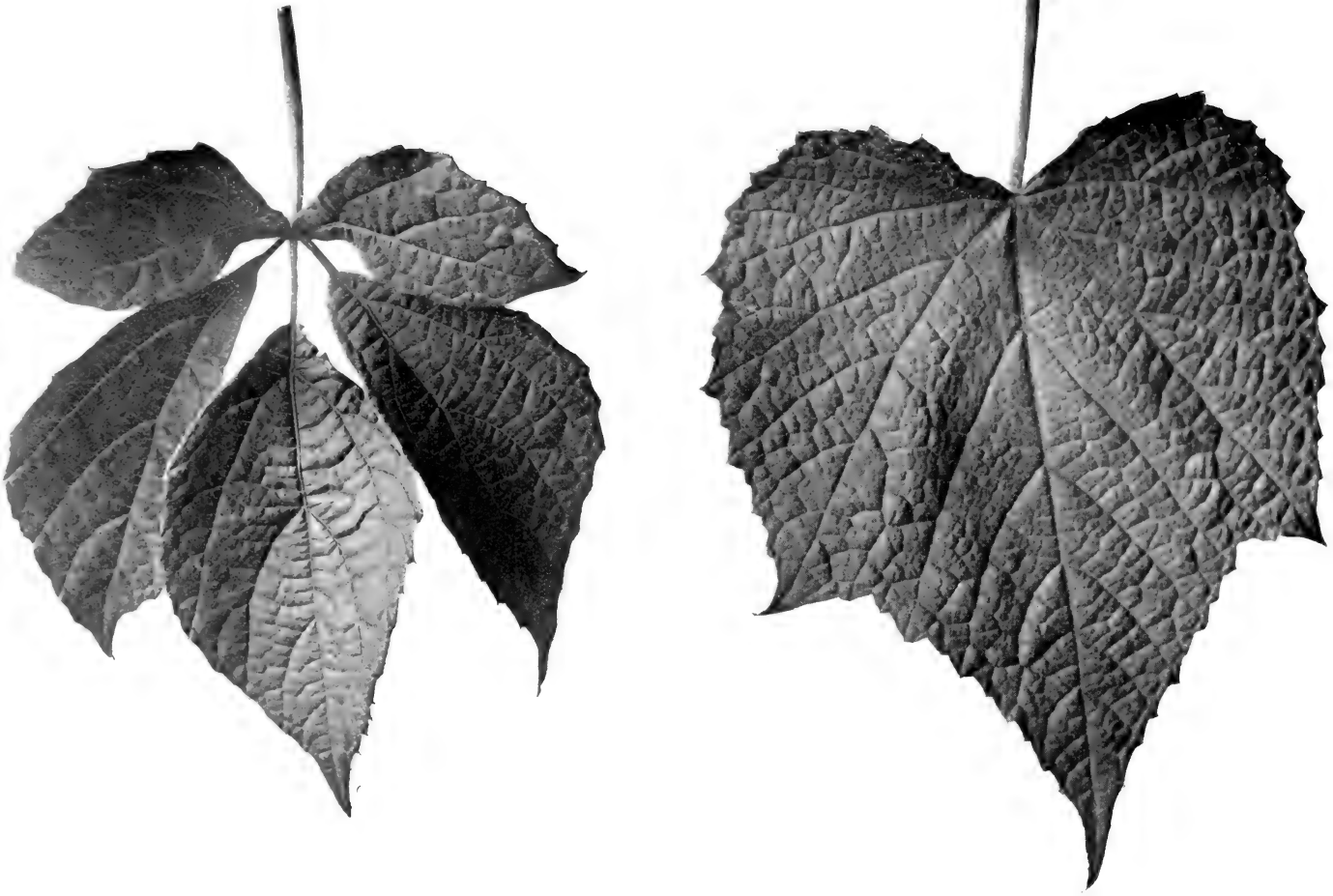


FIG. 99.—VITIS SINENSIS.

Two leaves from one plant. Length of cut leaf, $6\frac{1}{2}$ inches; of entire leaf, 5 inches; width of cut leaf, $5\frac{3}{4}$ inches; of entire leaf, $4\frac{1}{2}$ inches.

this and *Vitis inconstans* are probably two of the most widely-grown garden plants of the present day.

The self-supporting habit of *Vitis inconstans*, its neat appearance and beautiful autumn tints, probably account for the great appreciation which this plant receives, added to the fact that it withstands the smoke and heat of towns. In the cities of the United States of North America, and in London and other large centres of Europe, *Vitis inconstans* is met with in all situations. It adorns equally the palace and the cottage. A variety of this species called *purpurea* has purple foliage when young, which becomes bronzy-purple when mature, and retains this tint more or less throughout the season.

Vitis leeoides is very curious, and, as its name implies, bears a resemblance to the allied genus *Leea*, of which the beautiful stove plant *Leea amabilis* is a familiar example. The leaves are pinnate, composed of five leaflets, which measure from 4 to 4½ inches in length, and from 1½ to 2 inches in width. The margins are serrate, and the apex acuminate. All parts of the leaf are glabrous, the under-surface purplish in colour, and the upper bright green. It is a Chinese species, and was raised from seed at Coombe Wood (figs. 95, 96).

Vitis megaphylla. This is one of the most remarkable of all the species of *Vitis* in cultivation, and one of the most distinct of the new additions from China. There is no other Vine at all like it. In appearance the foliage resembles that of some of the pinnate-leaved Araliads, or of the well-known *Tecoma grandiflora* on a large scale. The individual leaves are compound, pinnate or bipinnate, 18 or more inches in length, composed of four pairs of leaflets, the lowest two pairs being themselves usually pinnate. The leaflets are from 5 to 6 inches in length, broadly ovate-lanceolate or oblong-ovate in outline, with coarsely serrate margins. The upper surface is dark rich green, and the underside glaucous green, glabrous in all its parts. The petiole is grooved along its upper surface, swollen at the points where the leaflets originate, and pale green in colour except where exposed to the light, these portions assuming a reddish-purple tinge. The stems are of the same pale glaucous green as the petioles, and are swollen at the nodes.

It is a rapid and vigorous grower, and at Coombe Wood in 1903 quite young recently-planted examples made shoots 10 feet in length in open borders (figs. 86, 97).

Vitis obtecta, another Chinese species, has digitate leaves, consisting of three to five leaflets, resembling a miniature Horse-chestnut. The terminal leaflet is the largest, and measures from 4 to 5 inches in length, the smallest about 2½ inches. They are oblanceolate in shape, emarginate along the basal portion, and serrate along the apical third of the leaf. The apex projects into an acuminate point, about half an inch in length. The inflorescence is a much-branched panicle.

Vitis Romaneti, also called *Ampelovitis Romaneti*, was first discovered by Père David in 1872 or 1873 in the mountainous regions of Southern Shensi, Central China, whence he sent seeds to Romanet, who successfully cultivated it in France, and in compliment to whom it was named.

It is a handsome Vine with large bold leaves, densely covered with white woolly tomentum on the under-surface, on which and on the petioles

and young wood are scattered numerous purple-tipped gland-like hairs, a character peculiar to this species, in which it differs from all others in cultivation with the exception of *Vitis armata*. The leaves are simple, cordate at the base, more or less five-angled, with coarsely serrated margins. They measure 7 to 8 inches in breadth, and are from 9 inches to a foot in length at the extreme points; the upper surface is dark green and glabrous, and the under-surface is covered with a white tomentum with large hairs or bristles along the principal veins (fig. 98).

The plants are said to be monœcious or polygamous, and the fruit is black and disposed in narrow bunches. It is a strong and vigorous climber, and an important addition to hardy Vines.

Vitis sinensis, a new species from China, was raised from seed sent by Mr. Wilson, and exhibited amongst the new Chinese Vines on September 1, 1903. The leaves are very variable even for a Vine; at the base of the plant they are usually simple, broadly ovate in outline, and more or less trifid; higher up they become more lobed, and at about 5 feet from the ground are divided into three, or occasionally five leaflets. The leaf-blade of the simple leaves measures from $4\frac{1}{2}$ to 5 inches in length by $4\frac{1}{2}$ inches in breadth; the upper surface is green, and beneath it is covered with a scattered tomentum, which is more prominent on the veins. The petiole is purple in colour, and measures 3 or more inches in length (fig. 99).

The leaflets of the divided leaves are petiolulate, rather irregular in outline, with serrate margins.

Vitis Thomsoni, a charming Vine, also recently sent to us from China, received the distinction of a First-class Certificate when shown at the Drill Hall on September 1, 1903. The leaves are digitate, composed of five leaflets, the terminal leaflet being the largest and measuring $3\frac{1}{2}$ inches in length by 1 inch in breadth when fully developed. They are dark purplish green in colour, with claret-purple under-surface, tints retained through the whole summer, and deepening in autumn to dark reddish purple; very beautiful when the light is seen passing through. The upper surface is covered with minute hairs, which are more prominent along the principal veins and margins than on the blade of the leaf; the under-surface is glabrous and glossy.

The small elegant leaves of this species, together with its beautiful colour and graceful contour, render it one of the best of the smaller-leaved kinds for outdoor planting (figs. 85, 100).

Vitis Thunbergii, a native of both China and Japan, resembles *Vitis Coignetiæ* somewhat in general appearance, but differs from that species in its slightly less vigorous growth, its larger leaves, and its richer, more brilliant autumn tints. The leaves are very beautiful in appearance, a foot or more in diameter, of the darkest glossy green on the upper surface, with a dense rusty-coloured tomentum beneath. In the autumn the hues assumed by the leaves of this species are even more brilliant than those of *Vitis Coignetiæ*, and it is at that season of the year that the two species may be best distinguished.

Vitis Thunbergii, like its ally *Vitis Coignetiæ*, has been much discussed by botanists, and there are still some open questions regarding its nomenclature, but for horticultural purposes it is abundantly distinct, and is one of the handsomest Vines in cultivation.

Fig. 100.—Vitis Thomsoni.
Spray, 12 inches in width.

FIG. 101.—VITIS HETEROPHYLLA?
Length, $5\frac{1}{2}$ inches; width, $5\frac{1}{2}$ inches.

FIG. 102.—VITIS DELAVAYI.
Length, $6\frac{1}{4}$ inches width, $6\frac{1}{2}$ inches.

FIG. 103.—VITIS SP. No. 532.
Length, $6\frac{3}{4}$ inches; width, $4\frac{3}{4}$ inches.

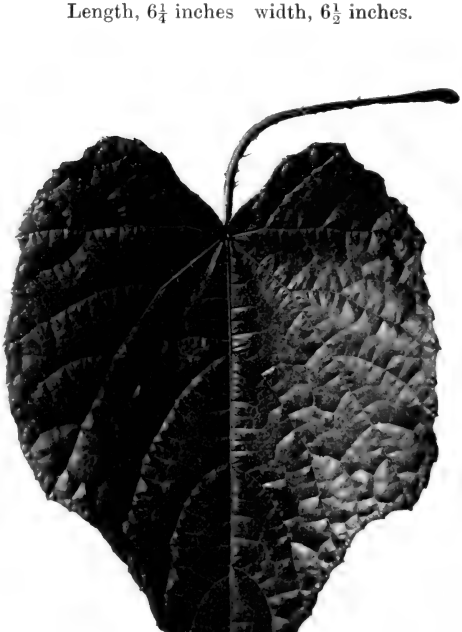


FIG. 104.—VITIS ARMATA No. 580A.
Length, $9\frac{1}{2}$ inches; width, $6\frac{1}{2}$ inches.

FIG. 105.—VITIS SP. No. 343.
Length, 7 inches; width, $6\frac{1}{2}$ inches.

FIG. 106.—VITIS SP. No. 672.
Length, 5 inches; width, $4\frac{1}{4}$ inches.

FIG. 107. VITIS FLEXUOSA, VAR. CHINENSIS.
Length, $4\frac{1}{2}$ inches; width, 4 inches.

FIG. 108.—VITIS SP. No. 428A.
Length, 6 inches; width, $5\frac{1}{4}$ inches.

The manner of its introduction and the date are both unknown, but the original plant still exists at the Knap Hill Nursery of Mr. Anthony Waterer, where it has stood for many years.

Vitis vinifera, the Grape Vine, is well known to all on account of the luscious fruit which it produces, and for which it is generally grown, but it is by no means devoid of interest or beauty when cultivated for ornament where ample space is available. The type, or one of its varieties, should certainly be included in garden collections, and several distinct forms are grown for decorative purposes only. Perhaps the best is the one known as *purpurea*, the leaves of which are green and downy when young, changing as they mature to a deep plum-purple, in autumn deepening in colour to a rich blackish-purple. The variety known as the 'Teinturier Grape' has green leaves resembling the species which in autumn assume rich and varied crimson and purple tints.

Of the cut-leaved varieties, that known as the 'Parsley Vine,' or *Vitis vinifera apiifolia*, is perhaps the one most frequently met with; it is worth growing for its light and graceful appearance, imparted by the deeply cut and laciniated leaves. This variety is also cultivated for its fruit, not of the first quality, but produced freely on walls out of doors. It is known to Vine-growers as 'Ciotat,' or *Vitis laciniosa*, and is said to have been grown in gardens since 1648.

Of species which are not quite hardy in other than favourable localities in Great Britain, mention may be made of *Vitis orientalis*, a native of the Levant, with purple leaf-stalks and bipinnate leaves, introduced, according to Loudon, in 1818, and figured by him in his 'Encyclopædia' from specimens growing in the collection of Messrs. Loddiges.

Vitis striata, from the Rio Grande do Sul, Brazil, an evergreen species with five-lobed leaves, usually known as *Ampelopsis sempervirens*, is not altogether a success, though sometimes met with.

Vitis himalayensis, from the Himalaya, is really a fine Vine, but difficult to propagate, and tender, except in the South of England and special localities. The leaves of this species are trifoliate, with coarsely serrate margins and prominent veins, clothed with adpressed hairs on the under-surface. The petiole is grooved. In autumn it is one of the earliest to colour, the foliage becoming a rich sanguineous red.

The so-called *Vitis* or *Ampelopsis Hoggi* is not a *Vitis*, but *Rhus Toxicodendron*, the 'Poison Ivy' of Japan.

Several other distinct Chinese species are growing at Coombe Wood to which specific names have not yet been applied. They may prove to be new species or merely geographical forms of species already known. Reproductions of photographs of leaves of a few of the most distinct are given (figs. 91, 93, 94, 103, 105, 106, 108).

THE HOLLYHOCK.

By George Webb.

Few plants surpass the Hollyhock in stateliness or grandeur when it is at its best, under favourable conditions, and its proper treatment is understood. They possess a great range of colour, from the purest white to almost black, and if well grown, so that each flower is distinctly seen on the spike, the effect is very striking. It is one of our oldest garden flowers; in fact its history is very remote. It is mentioned by Gerard and others upwards of three hundred years ago, but only two varieties with double flowers are mentioned, viz. double red and double purple; hence we are probably safe in assuming that these two double forms were the first parents of all our present double varieties. The crossing of these two with all the various shades of single flowers was taken up by a Mr. Charles Baron, a shoemaker of Saffron Walden, in the early part of the last century, when many shades were produced, all of a semi-double character. These were handed on to the famous raiser, the late Mr. William Chater, to whom we are indebted for the many lovely shades of colour we now possess. Mr. Chater raised and distributed them far and wide, and in 1847 published his first catalogue of named varieties, and continued issuing one yearly, and adding new shades and forms until 1873, when the disease made its first appearance and devastated his plantations with great virulence, and many of his choicest flowers were lost for ever. For several years after this date it was difficult to procure a plant, either from seed, cuttings, or grafts, in a fit condition for planting; hence the old method of propagation had to be discarded both in raising plants and also in the cultivation for flowering. The wintering of plants under glass for propagating purposes had to be abandoned, and the treatment of the Hollyhock as a hardy plant was found to be the only method by which the disease could be combated, and the raising of plants from seed the only practical form of propagation. In fact, all our named varieties are now obtained from seed, all being raised in the open ground, and they are equal in quality and far superior in constitution to those propagated by means of cuttings or grafts.

The seed of the Hollyhock may be sown in the open ground at the end of May or beginning of June, when it will quickly germinate, and in a few weeks will form one single taproot. When these attain to the size of the little finger each plant should be partly lifted with a spade, entirely severing the taproot, after which new fibres will soon be formed, and in a few weeks it will be in good condition for transplanting to its flowering quarters.

The Hollyhock requires a good depth of soil, and in order to obtain the best results it is most important that it should be well prepared by trenching or double digging to the depth of 2 ft. at least, leaving the bottom soil at the bottom, and if it is of a poor or light character a plentiful supply of cow manure should be incorporated as the work goes on. The soil being thus prepared for the planting, proceed with the work

as soon as the plants are of sufficient size, bearing in mind that if this can be accomplished by the end of August or the early part of September so much the better, as the plants will be enabled to become well rooted and established before the winter sets in. For although the Hollyhock may be considered under this treatment quite hardy, I have known it to succumb and wither away when planting is deferred until late in the season. The plants require plenty of space in order to develop their large spreading foliage. They also like an abundance of air, which is indeed essential to a healthy growth; hence a distance of not less than 3½ ft. apart is absolutely necessary. Little further remains to be done but an occasional look after a grub similar to that which attacks Lettuces and other plants during the autumn. If left undisturbed it will work great havoc and mischief, but its presence may easily be detected, as the plants will show symptoms of flagging and withering from the root, being all but eaten through; but it can easily be arrested by removing a portion of the soil with a pointed stick a few inches from the surface. Keep the soil well stirred by frequent hoeings during the spring months. Secure the plants against boisterous winds with a strong stake about 4 ft. in length, tying the plants to it as growth proceeds. Give copious waterings with liquid manure during dry weather whilst the buds are forming; a mulching of stable litter will also be of great service in assisting the plants to open their numerous flowers and also in prolonging their flowering season. Thin out the buds where crowded, leaving them evenly distributed up the spike; where large flowers are required the top of the spike may be shortened, but in doing this we are also shortening its duration of flowering. Remove all lateral shoots from the stem, and where not required for propagating purposes all lateral shoots from the bottom are better cut away, leaving one spike only to each plant. Continue the watering even whilst in bloom, should the weather remain dry, as this will enable the uppermost buds to open into good flowers and then produce a handsome spike of three or more feet of flower length.

Perhaps it may not be out of place here to give the definition of an ideal spike as set forth by the late Mr. W. Chater in one of his old catalogues. "In judging, the first point I notice is the individual flower on the spike, the petals of which consist in their being of a thick substance, the edges smooth and even; the florets occupying the centre must be full and compact, closely arranged, rising high in the middle, and of a globular form, with a stiff guard petal extending about half an inch, or in proportion to the size of the centre ball, so that the different parts of the flower present a uniform appearance. Second, the arrangement of the flower on the spike should be regular, not crowded together in a confused mass, nor loosely hanging with open spaces between each flower, but so disposed that the shape of each may be distinctly seen when fully blown, the uppermost covering the top; nothing can add more to its beauty than a few small green leaves, which give it an elegant and graceful appearance."

The plants, having finished blooming, may be cut down, and if intended to flower a second year they will need protection during the winter, so that rain or snow can find no lodgment at the crown, as, if it do so, the plant will rot away; a covering of bracken or short stable litter is a very good protection. If the soil is wet or of a heavy retentive nature,

it would be advisable to remove the plants, say to the foot of a south wall, protecting them in severe weather with a light covering of litter, for although the unbloomed seedlings are perfectly hardy, the bloomed plants need this extra care and attention. They may be replanted by the end of March and treated exactly as recommended for the unbloomed plants, but will require their shoots thinning out when of sufficient size.

Should any extra fine specimens be obtained from seed and it is desired to perpetuate them, the propagation by cuttings or grafts must be resorted to, in which case the bottom of the side laterals must be allowed to remain, simply shortening them back a few inches in order to allow the buds at the base to develop. These will produce the summer cuttings. Each shoot should be cut up into lengths of about four inches, cutting each immediately below a bud and allowing the leaf-stalks to remain. Place the cuttings in a smoothly prepared bed in the open ground, leaving a portion of both the leaf-stalk and stem above the surface, in fact very similar to the propagation of vines from eyes. Sprinkle the cuttings over with water should the weather come dry. They will start to root in a very short space of time, and when sufficiently rooted they should be carefully lifted and potted in 54-size pots. The Hollyhock strikes root very readily in this manner, and may be propagated in very large numbers, but the difficulty is to preserve them during the winter. I have known plants, which appeared strong and healthy in every way, die off unaccountably by the thousand in the winter prior to the fungus making its appearance. A light, airy, cool greenhouse seems to be the most suitable shelter.

Another plan of propagating is from cuttings or grafts under glass in the spring. Plants intended for this purpose should have all their growth removed at the end of the flowering season, leaving only the eyes, or dormant buds, which will furnish the spring cuttings. Remove a portion of the soil from the main stem with a trowel to the depth of two inches, and about nine inches from the main stem; mound the roots well up, covering all the eyes over with cocoanut fibre, or some other similar material, and see that every particle of the stem where there is a bud is well protected. This covering is a means for protecting the eyes, which will produce the future cuttings, against the disease, since the condition of the atmosphere at this season of the year is highly favourable to its development. By the end of October, lift the plants carefully, shorten back their longest roots, pot them into 16-size pots, plunge the pots outside in a bed of cinder ashes, and protect their stems and buds as previously recommended. They may remain thus until about the first week in January, when they should be placed in a moderately warm greenhouse, near to the glass, admitting air on all favourable occasions, and of course removing the cocoanut fibre. Growth will commence in a very short time. Take off the cuttings and plant in small pots in the same way as with Dahlias, and place the cuttings in a close frame for about three weeks or a month, admitting air at night in order to avoid their fogging off. They can then be introduced to a gentle bottom heat, and when sufficiently rooted, gradually harden them off in a cool frame or house, shifting them into larger-sized pots, ready for planting out in their flowering quarters in March or April. When propagating by graft,

select well-ripened roots of single varieties, or, if single ones are not procurable, portions of the roots of old double ones, and cut them into lengths of about four inches. The system generally adopted is that of whip-grafting; treat these exactly as recommended for the cuttings.

There is yet another system by which they may be propagated. This is by budding in the summer on to the roots of single varieties. Select well-ripened side shoots of the summer growth, as advised for the summer propagation, and insert them in the root close to the neck of the stock, similar to the budding of Dwarf Roses on the seedling Brier.

In propagating under glass it must be borne in mind that there must be no suspicion of disease (*Puccinia malvacearum*), since the somewhat close and damp atmosphere of a greenhouse is a most suitable breeding-ground for its development, and when plants are once attacked it is very difficult indeed to eradicate it; hence the raising of seedlings under glass for flowering the following summer is not recommended.

There is another form of disease peculiar to Hollyhocks, which wrought great havoc amongst them in past years, and when prevalent was more destructive even than the *Puccinia* of modern times, since it did not attack its victim until the plant was just coming into flower, and in some instances until actually in full bloom, and then the whole plant would wither and die in a few hours, which was considered at that time very mysterious, and to which no apparent cause could be attributed, the plants to all appearance being perfectly healthy during the evening, and by the morning completely withered up. The late Mr. W. Chater attributed it to their being planted in new soil freshly broken up. I have not seen this disease for years; in fact, practically nothing of it has been discerned since the competitive times; hence I think we may be safe in assuming it had its origin from overfeeding with undecomposed manure and other gross materials in order to obtain extra large blooms for exhibition purposes, which no doubt brought about a disease at the root, as no trace of any form of disease was to be seen either on leaf or stem.

With regard to the *Puccinia* of to-day, I very much question whether any specific in the way of dressing &c. has yet been discovered that has proved effectual in eradicating it, but as a preventive I have found nothing to equal a preparation sold by chemists to farmers for dipping sheep, which appears to be a mixture of tobacco-powder and carbolic acid. A sprinkling of this on the under surface of the leaf in the early stages of growth is a great help in warding off the attacks of the fungus in question. It acts also as a means of keeping down the red spider, to which Hollyhocks are very subject in dry seasons; but if the hardy treatment is adopted in all its particulars, both in the raising of the plants and in their after-cultivation, *Puccinia* need not cause any terror.

AUTUMN-FRUITING RASPBERRIES AND STRAWBERRIES.

By James Hudson, V.M.H.

These fruits, so well known and so much appreciated in the summer season, have not, until within the past year or two, been duly recognised for regular supplies in the autumn. My object in detailing our mode of procedure at Gunnersbury is to encourage and extend their cultivation for autumnal supplies.

Raspberries.

Cultivation, Soil, &c.—In this respect there is no deviation from that given to the summer-fruiting varieties. Where the one thrives well, there also will the other succeed. It is advisable, however, to avoid a shaded position, all the light possible being needed to mature the fruits as autumn sets in, and likewise to guard against decay during damp weather. It is well, therefore, to select as open a spot as can be chosen; if facing the south or south-west, so much the better in order to secure as much benefit from the sunshine as can then be had. Avoid a heavy, retentive soil—this may be conducive to growth, perhaps, in some instances, but not to the maturing of the fruit. The rows should run due north and south when it can be so arranged. In our own case it is the reverse, but I should prefer it otherwise. The rows should be 6 feet apart in order to allow plenty of room for the circulation of air and for light between the rows. During the winter a dressing of farmyard manure is applied and lightly forked in, but should the growth be luxuriant, this may be dispensed with in alternate seasons, a dressing of lime being substituted. When the ground is being dug over, all the suckers that have run out are carefully removed. These Raspberries are more disposed to throw out suckers than the summer-fruiting varieties.

Pruning, &c.—These Raspberries fruit upon the young wood of the current season, therefore the pruning is merely a matter of cutting down to the ground line. I do not advise this to be done, however, too early, otherwise the young growths will be correspondingly early and therefore liable to be cut off by late spring frosts. (Even with this safeguard we were caught in April 1903, when severe frosts ensued, and the growths were thus thrown back for fully a fortnight.) If pruned by the middle of March no time will be lost. About every third year it is a good plan to replant all, or, say, do one third of the stock every year. This will allow of the ground being thoroughly trenched three spits deep, and for a liberal application of manure. In planting afresh select the strongest stools only, casting aside all the weak ones. A good distance is 6 feet between the rows; there is no gain in planting closer, and in the rows it will be, say, 4 feet from stool to stool. The growths are allowed to come away in a natural manner, only the very weakest should be thinned out, no tying being done until it is seen that there are a sufficient number of shoots showing for fruit. This will be during the earlier part of August,

or possibly by the end of July in some instances. Then, if there are too many shoots to tie up, those without any fruit are cut out to allow room for those with fruit. (I might add here that our crop was late in showing this season, hence it was the end of August before we had finished thinning and tying.) The shoots should be tied erect, or as nearly so as possible. Our plan is to tie in a continuous line rather than in groups. By means of bamboos a light trellis is made, to which the shoots are secured. A good plan being to sling each shoot separately, if not too long, to the bamboo next above, the longer ones being first tied to the same bamboo. Thus the one does not shade the other. Careful tying up prevents injury to the fruits during strong winds and gales. The first picking generally commences early in September in sufficient quantity to keep up a supply. It continues generally until the end of October. Last year (1902) we picked good dishes up to the middle of November, but that is an exceptional instance, I think. This season, 1903, there is promise of a late picking too, if the early frosts are not too severe. Protection is afforded against the depredations of birds by covering over the entire quarter with netting. For this we use nets made upon the square mesh (1-inch mesh) rather than use the old fish netting, which does not cover nearly so well. Towards the end of October, if there are still sufficient fruits left to ripen, it will be found a good plan to cover over with an additional net to protect from frost. It is surprising how much frost one net will keep off; two, therefore, will be more effectual.

Varieties.—The old *October Red* is still a good variety to grow for a late crop. The growth is somewhat short and stocky, the fruits of medium size.

Belle de Fontenay is a better variety for general cultivation than the preceding, coming into bearing earlier, the fruits being larger and the growth stronger. We have also another variety, of which I do not know the name thus far (it was sent from France without a name attached). This is the finest in every sense, a robust grower and one that fruits abundantly. It comes into bearing rather later than the preceding. We also grow a yellow variety, 'Surprise d'Automne,' but this, so far, has not had a sufficient trial to be able to speak of it with any confidence. In addition there is the new variety first shown by Messrs. James Veitch last autumn; this I have not grown yet at Gunnersbury.

Uses.—We find that the autumn Raspberries are in great demand in the kitchen and stillroom for various purposes. As an addition to the dessert they are also welcomed when well ripened.

Strawberries.

These resolve themselves under three heads for autumnal supplies, each distinct in itself, viz.: 1. The Alpine or 'Quatre Saisons' of the French. 2. The so-called perpetual-fruiting varieties, of which 'St. Joseph' may be taken as the type. 3. The plants that have been forced in the spring, from which a *secondary crop may be obtained.*

1. The Alpine Strawberry has been catalogued for very many years in almost every nurseryman's list, being offered as runners. This is a great mistake, and as such should be erased from all catalogues. Owing to this

system of cultivation from runners it is no wonder that these Strawberries have never become popular, or even satisfactory under good culture.

When raised, however, annually from seed success may be assured, even under moderate conditions. The difference between seedlings and runners is most marked both in vigour of growth and fertility. Our plan is to sow the seed every spring from the middle of March to the middle of April. This is done in shallow boxes, 1 foot by 2 feet, rather than in pots or pans; hence the seed is not sown so thickly, whilst moisture is retained for a greater length of time. The soil used should be light and friable, say leaf soil and sandy loam in equal proportions. A house or pit where the temperature can be kept at from 55° to 65° will be a good place for raising the seedlings. When these are large enough to handle and have made a fair amount of roots they should be pricked off. For this we use boxes of the same size as for the seed, putting about fifty young plants in each box. At this distance apart they do not become drawn up or weakly, whilst with each plant when next transferred to a border outside a good ball can be secured. The pricking off should be finished in May, the plants being then kept in a cool frame for a time until established and growing freely. Then, if the room be wanted, they can be stood outside. Later on—say, during July—the stock is again moved, being this time transferred to a partially shaded border (ours faces the east). Here they are put out with as much soil as possible at about 6 inches apart, so that a small hoe can be worked between them. Here they remain until October, when as a plot of ground becomes vacant they are planted out in their fruiting quarters. Meanwhile all that needs be done is to keep the ground well stirred and any young runners removed, paying attention to the watering during hot weather as may be needed. The ground selected should be well trenched, being manured according to its needs. We use farmyard manure and lime. Light soil is preferable to a close retentive soil for the Alpine Strawberry, whilst if somewhat shaded it is just as suitable for the wellbeing of the plants. The ground should be set out for the rows at 18 inches apart, then plant three rows and miss one; thus a three-feet space is left between each bed of three rows. If the ground be limited, some space might be spared by planting four rows instead of three and then miss one row. Plant firmly and water afterwards. If slugs or worms are troublesome, an occasional light dusting with lime will serve a good purpose. During frost the plants may be somewhat loosened; should that occur they should be made firm again when a thaw has taken place. Besides keeping the ground well stirred upon favourable occasions, no other attention will be needed until the first flower-spikes and then the runners appear. These should all be removed up to the first week in July, after which about half only should be taken off ten days later on, so as to give a succession. These seedling plants will under this treatment give a good succession of fine fruits and in quantities from the end of August well on into October, or for nearly two months. This plantation will the following year commence to fruit in the regular season, ripening about the same time as 'Royal Sovereign,' but continuing until the next set of young plants are again in bearing. Thus Alpine Strawberries may be

had without any difficulty whatever from about June 20 until the third week in October, or over a period of about four months.

Varieties.—The best to grow of the Alpine Strawberries are 'Rouge Amélioré,' or 'Improved Red,' which produces elongated fruits of a bright colour; 'Sutton's Improved Red' which is somewhat similar and of robust growth; 'Belle de Meaux,' which has darker-coloured and rotund fruits, and the 'Improved White,' which should be grown for the sake of its colour. All are equally fruitful and also of high flavour. In gathering the fruits we pick straight away into small fancy baskets, which then go upon the table as they are; or, if for travelling, into small square baskets or punnets, which are then packed into boxes. When picking for the former purpose no stems are taken with them. No plants are fruited after the second year's crop is taken. We grow about a thousand from seed every year.

2. *Perpetual-fruiting Strawberries.*—These are the result of crossing the Alpine with the summer-fruiting varieties. They are very useful indeed for autumn cropping, being reliable even under such seasons as the present, but are a degree later in arriving at maturity. The best position for them is a warm border where all the sunshine during the autumn can benefit them. Our plan is to pick off all the early or first crop of flower-trusses, in order to concentrate the vigour of the plant upon the secondary growth and the spikes that succeed the same. In this way I find that we gain something in point of time and likewise in the crop. This season, for instance, the first fruits of 'St. Joseph' were ripening the third week in August—these came in extremely useful for kitchen use. Part of the stock of these Strawberries is grown in pots in order to extend the season until the end of October and sometimes into November. The runners to provide this crop are layered right away into 48-size pots as soon as we can secure them. I like to see them all layered by the middle of July, and well rooted by the end of the month. By the middle of August, or thereabouts, they will be fit to take off, and by the end of the month the first flower-trusses will be showing, so precocious are these young plants. A light sunny position should be given this stock whilst still out of doors. The earliest will be fit to house by the middle of September. In doing this, the better plan is to make a selection of the forwardest plants. Give them at once positions near the glass, on shelves if possible, as with the spring-fruiting stock. Later batches can be brought in as may be desirable, but it will be found the better plan to house all that are showing flower by the first week in October. A freely ventilated house is the best place for them, no artificial warmth being needed until October is well advanced. By using the syringe freely, there should not be any fear of the red spider. As these plants go out of bearing, they are set aside for the next season's crop in the open border, being planted out as soon as convenient. It is not expedient on the whole to save the old stools over for the second season's crop in the open. It may be done—in fact we have them still at Gunnersbury in good bearing, October 13. These plants are put out at about 2 feet each way. In wet seasons like the present, we find a great benefit by using bell-glasses to cover the plants. (The *cloches* of the French growers are what we use; these in the spring cover the earlier crops of Lettuce, and in two seasons will well repay their initial cost.) These

should be put over the plants by the middle of September. Before doing it, however, it is a good plan to go over the plants and take off any superfluous foliage, afterwards propping up the fruits upon sprays made of old birch brooms, or by means of wire supports, so as to keep them quite clear of the ground. Of these Strawberries we grow about 1000 yearly in pots, planting out only the best afterwards. *Varieties*:—The pioneer of this section was probably 'Louis Gauthier.' We do not grow this now, as it fruits in autumn only upon the runners, whereas all the following fruit upon the old stools in addition:—'St. Joseph,' recommended for its cropping qualities more than for its flavour; 'Jeanne d'Arc,' similar to, but on the whole better than, the preceding; 'Oregon' and 'St. Antoine de Padoue'—these I have bracketed, for they are very similar: they are the two best autumn-fruiting varieties for dessert, cropping well, and of good flavour: both are similar to 'Royal Sovereign.'

3. *By means of plants that have been forced the previous spring.*—For several seasons in succession we have derived part of our crop by this method. Some of these fruits, picked in the open, were shown before the Fruit Committee at the first August meeting of this season. These came into bearing soon after the last of 'Latest of All' were gathered. We select for this purpose the earlier forced plants—those that ripened their first crop about the middle of April. I prefer these to the later stock, which is not always so reliable for second fruiting, but tends rather to make a luxurious growth. This year we planted out those chiefly that were forced in 48-size pots, and, with the favourable time for establishing them in May, we found them to succeed very well indeed. We do not plant out all from one stage of forced plants for the obvious reason of securing a succession. (It is well known that these plants, even if they miss fruiting in the autumn, will yield a heavy crop under natural conditions the following season.) Last year, and this also, we have adopted the plan of potting on the early forced plants from 48's into 32's, or from 32's into 24's. In this way we have added considerably to our source of supply. Scarcely a plant missed showing one or two trusses; but, as we did not want the earliest, we pinched them out in order to get a later truss if possible. This season we have a good batch potted from 48's into 32's from which a good picking has been taken, and now we have this batch of plants as a whole, which will be the first plants to put in for early forcing this coming season. They are by far the strongest and best crowns we have, being much better than this season's runners. I see no reason whatever why this method should not be extensively adopted, especially of potting, from 48's into 32's. 'Royal Sovereign' is the variety I have treated in this way, and it is the second season of the experiment.

THE ADVANTAGES AND EVILS OF SIZE IN FLOWERS, FRUITS, AND VEGETABLES

By E. T. Cook, F.R.H.S.

When I was asked to read a paper upon the advantages and evils of size as affecting flowers and fruits, I felt that it was a subject that could have been handled by many others in a far more masterly way than by myself. The remarks, however, which I may make will, I hope, have some influence in reforming the bad practices of those to whom we may rightly appeal for a due proportion in the ideals which have been set up by them as a standard of beauty in flowers and of quality in fruits or vegetables.

The desire of some growers is to exaggerate a flower to the destruction of natural beauty, and in fruits and vegetables to the point of deterioration.

The Rev. G. H. Engleheart, whose opinion I desired and obtained, with many others recorded in several letters which I shall read to you, takes as an illustration a flower which offers an object-lesson of the evil of abnormal development, which is of course an offence against the canons of good taste. He says, and with his words I am in full sympathy :

" The flower of all others which appears to me to have suffered from bad taste is the one under our eyes at the present season—the Chrysanthemum. So long as size stands first of the criteria which guide the judges at our shows—and this is true of other flowers besides the Chrysanthemum—there will remain a great impediment to the bettering of the public taste. Vividness and refinement of colour should, and ultimately will be, the first touchstone of excellence. Fortunately the splendid material now available in the outdoor class of Chrysanthemums is fast educating the public taste in this contest of mere size versus other qualities. Indeed appreciation of attributes other than bigness has within my memory advanced 'all along the line.' Just as such a Rose as 'Paul Neyron' has vanished from Rose shows and even from most catalogues, so perhaps in no flower, except a restricted department of the Chrysanthemum, do mere length, breadth, and thickness count for much, apart from the superior qualities of colour, fragrance, and profuseness of bloom. In my own particular flower, the Narcissus, the most brilliant of the purest colour has not yet been joined to the maximum of size, and possibly never will be. But I find that more and more a shade nearer to scarlet or pink or of purer white, or some gain towards perfection of form, is set higher in the general estimation than the simply gigantic."

In horticulture, as in most things, the middle course is safest and best, and anything beyond a certain proportion is a step backward. To take an illustration of a popular garden flower, *Coreopsis grandiflora* is not an improvement upon the *C. lanceolata*, the bigger flower possessing a certain coarseness which detracts from the true merit of the plant; and several forms of *Chrysanthemum maximum*, praised for their bigness, are at the same time much coarser and certainly less beautiful than the parent.

The market grower sins greatly, but he must be forgiven while the public appeals to him to supply the showiest, and in their eyes the best, though it is pleasant to discern a bettering of the public taste in its appreciation of what constitutes "flower beauty," and this taste may surely be attributed to the desire for single flowers in the house and in the garden. But I will be fair in my judgment. In spite of the fashion for simplicity in flower decoration, which is happily setting in as a reaction from over-cultivation and a desire for bulk, we are not unmindful of the great debt all flower-lovers owe to those good horticulturists who have improved and are constantly improving original stock. It is only when a naturally beautiful flower is made hideous by elaborate cultivation, over-development, or both, that we thrust it aside as a miserable deformity unworthy of the hybridist's skill or the cultivator's experience.

Some may have practical proof of the results of too high feeding. Superb Mignonette flowers for size were bought some short time ago from a market grower, but in a few hours so tainted and discoloured was the water in which they were placed that it was impossible, though the water was changed, to use them for room decoration—they positively smelt of the manure tank.

While condemning the forcing of a flower beyond a size which is just right, we must not forget that there is another interference with the natural growth of a plant which does not make for beauty.

Nothing is more frequent in books or catalogues than to find the words "dwarf and compact" used in praise of some annual plant, and used with an air of conviction, as if to say: "There, now we have got it 'dwarf and compact.' We have done our whole duty by it; buy it and grow it, and be happy."

Is it an ungenerous and ungrateful act on the part of some of us that we are not content to accept "dwarf and compact" as the end of all beauty? Is it not rather, as we venture to think, a question that demands the most careful consideration and the exercise of the most well-balanced judgment in the case of each individual kind of plant that is commonly grown for the adornment of our gardens? For planting beds in a geometrical garden, where the object is merely to fill spaces of certain shapes with a mass of some chosen colour, these dwarfed plants are all very well, and no doubt this is a way of gardening that has its uses. But because the dwarfed form may suit such use in perhaps one garden out of a hundred, it is not a reason for denying the best possible form that the plant might have to the other ninety-nine. May it not be one of the many cases in which the practice of what is easiest has falsely taken the place of what is best?

The over-doubling of flowers is another matter that is often fatal to beauty. Many a flower is better for a judicious degree of doubling, but when it is carried too far it turns what should be a handsome flower into a mis-shapen absurdity. This has been done in the case of Zinnias. In this fine flower moderate doubling is a gain on a well-grown plant a couple of feet high. But there is a monstrous form when many rows of petals show one above the other. In this the flower is robbed of all its natural beauty and becomes an absurd cone of quite indefensible ugliness, and it is all the more deplorable an object when this monstrous flower is

grown on a dwarfed plant. The orthodox Hollyhock is also much too thickly doubled, so that it becomes a tight wrinkled hemisphere. The beautiful Hollyhock has a distinct wide outer petticoat, and the inner portion is not so tightly packed but that its component petals, though closely grouped and loosely crumpled, admit of the free play of light and colour.

The undesirable influence of the rage for novelty, rather than a calm judgment of what is most beautiful, is also seen in the matter of colour. Some flowers have naturally only a tender tinting, which seems to be so much a part of their true nature that attempts to force them into stronger colouring can only detract from their refinement. Such a plant is the delicious Mignonette, with a tender colouring that seems like a modest self-depreciating introduction to its delicious and wholesome quality of sweetness. The slightly warmer shade of the anthers in the plant of normal tinting, with a general absence of any positively bright colouring, is exactly in accordance with the plant's true character, and with that modest charm which gives it a warm place in every gardener's heart. But when, as in some of the recent so-called improvements, the graceful head is enlarged and condensed into a broad thickened squatness, with large brick-red anthers, the modest grace which formed the essence of the sweet flower's charm is entirely gone, and in its place we are offered a thing that has lost all beauty and has only gained a look of coarseness. And these broad thick blooms have a suspicion of rank quality about their scent which was never apparent in the older forms, as I have previously mentioned.

All honour and grateful acknowledgment are due to seed-growers both at home and abroad for the many grand plants that we owe to their careful labours. I know that they will take these remarks in good part, and, after all, it is only by letting the raisers of new flowers know what is wanted that we may expect some day to get it.

When considering fruits and vegetables we stand perhaps on more definite ground than in defining the borders of good taste in the development of a flower. But let me first state that the majority of raisers of new fruits at the present day—and vegetables, I think, may be included with them—are actuated by the praiseworthy desire to place flavour first, and one reason is that the palate of the British public is no longer quite so satisfied with the turnipy Pear or watery Strawberry; and this placing of flavour before bulk is, I am happy to say, one of the creeds of the Fruit and Vegetable Committee of this Society. May it long continue a policy so beneficial in its influence on the raisers of new productions!

It is my belief that large fruits and vegetables rarely pay for the growing, and those who have the overlooking of allotments and cottagers' gardens, or have influence in the many gardening societies now established throughout the British Isles, should discourage the over-development of their produce, because it is a practice at once wasteful and destructive of good quality. Vegetables in almost all cases should be cut when young, therefore a strain which attains reasonable size quickly, offers a distinct advantage. The grower naturally wishes to produce fine well-developed specimens for the table, and the temptation is to leave them so long that good quality is sacrificed.

In Apples and Pears for cooking, size is a distinct merit, as it saves waste

in paring, and we not only get it in such a variety as 'Golden Noble,' but excellence of appearance and quality as well, with productiveness into the bargain. But for dessert fruit, as a rule, a medium is greatly to be preferred, though few people grumble at a ripe 'William' Pear, which, taken at the right moment, combines all other good qualities with its noble proportions. It is clear therefore that size is a merit, though not of the first importance, and must give way the moment it begins to encroach on quality.

Another point to be remembered is that, to obtain size, production must be unduly restricted, and an even crop, whether of flowers, vegetables, or fruit, is much more to be desired for the use of the homestead than a few overgrown specimens to place upon the showboard.

I again quote from Mr. Engleheart's letter: "We seem in England to be held fast in a vicious circle, at all events as regards vegetables and fruits. The public demands large coarse productions, and growers and raisers say they can do no other than cater to the public taste or want of taste. It would seem that there is some inherent want of perception in us as a nation. A salesman or purchaser in Covent Garden would not look twice at the exquisite little Muscadine Grape, the 'Chasselas de Fontainebleau,' so prized in Paris, and the choicest crop of which, I believe, is still reserved for the use of Russian royalties. Give us English folk the ponderous Turnip-flavoured 'Gros Colman,' or the vapid leather-skinned 'Alicante.'"

An Italian gentleman of my acquaintance who has a very good knowledge of English fruits, old and new, begged me to send him trees of the true little Shropshire Damson, as superior, in his judgment, to any other Plum. Another friend, a lady born and resident in Holland until she settled in England, complained to me that her gardener, a man of first-rate reputation, must be a very bad one, because his vegetables were so large.

And, to take this department first, what conceivable advantage is there in size in vegetables? The big Cauliflower will fit no saucepan, the big Potato must be cut, and thereby admits water and is spoilt. The monster Onion does not keep. Carrots and Parsnips are delicate and good for the table in inverse proportion to their size. Will the grower of "one dozen 'Ailsa Craig' Onions, weight 37½ lb.," inform me what possible benefit has resulted from his misapplied ingenuity? The accident that Tomatos are sold by weight, and of course cannot be cut to make an exact pound, has caused the greengrocers to dislike a very large sample. But the false standard of a smooth round shape has thrust flavour, which in the Tomato should be absolutely the prime consideration, into the second place. I am not sure that any of our modern Tomatos are as good to eat as the old corrugated red.

In fruit, too, the general law seems to be that high flavour is not associated with the largest size, though the rule is not so sweeping as in vegetables. In Grapes there is a decided advantage in size of berry, because of the tediousness of dealing with the stones in eating the smallest varieties. The aim should be to obtain Grapes equal in size and flavour to Muscat of Alexandria and Muscat Hamburg, ripening in a cooler temperature and keeping through the winter. But until this is accomplished it is very difficult to understand why the wealthy amateur does

not grow the delicious little Frontignans and other small-berried varieties which possess flavours and qualities of flesh unknown to the Grapes of the shops.

In Apples a distinction can at once be drawn between the culinary division and that of table fruit. The Apple for the kitchen can scarcely be too large, as it must be either baked whole or cut, and cooking excellences are not necessarily absent from the largest Apples. But for dessert, or to put in one's pocket for outdoor luncheon, very big Apples are out of place. A well-grown Cox's Orange may be taken as the standard of perfection, and to preserve or even to heighten the Cox flavour in free-bearing, late-keeping Apples with hardy blossom and of this same moderate size should be our endeavour. Pears come under much the same rule.

In Plums, both table and culinary, flavour seems to reside mostly in the smaller fruit, witness the old Greengage and the Damson. Could the high flavour be retained, the Damson might with advantage be doubled in size to lessen the proportion of stones in preserves and tarts. For dessert the Greengage is large enough, and in raising sweet Plums of new flavours we need not attempt to increase the size.

In Peaches and Nectarines we may take the medium size of the current varieties as the best standard. Guests at table, especially ladies, are embarrassed by huge fruits, and they have no countervailing advantage. The raiser may be guided in his selection by flavour alone, since most of his seedling fruits will be large enough.

One does not want "to make two bites" of a Cherry or a Strawberry, and here Nature seems to have restricted us to convenient limits. In Strawberries, excess of size, besides being useless, seems to be accompanied by loss of flavour. If we can reproduce the size and flavour of 'British Queen' or 'Dr. Hogg' in plants not fastidious as to soil, the question of size versus flavour need not trouble us further. The size of berry, however, might with advantage be increased in the Hautbois and Alpine Strawberries for those who prefer their flavour.

In Raspberries the old Red Antwerp is still entirely the best in quality, but its berry might be enlarged to the size of Superlative or even beyond it as an unquestionable advantage.

Then there is another aspect of this question—the chemical and physiological. Water and manure are aids to the production of bloated fruits and vegetables, but growth, stimulated by such means, does not signify greater nutritive power. Let it ever be remembered that it is possible to overwater and overfeed a root or fruit crop. More water and stimulating food are given and absorbed than can be proportionately assimilated, and therefore starch and sugar or the proteids are in an adulterated condition. Unhappily this worship of size is encouraged greatly by judges at the country shows in particular, though not to the same extent at those exhibitions where the judges are men of thorough understanding in the important duties they are called upon to undertake. To sum up briefly; size in a flower is an evil when it is destructive of natural beauty.

The hybridist and raiser who so stunts or dwarfs a plant that its grace and beauty are destroyed degrades a noble art.

In fruits and vegetables, quality always rather than size.

If the judges of vegetables would adopt a common-sense standard and make their awards in favour of the vegetables they would pick out for consumption at their own tables, I doubt whether the large ones in the show would be those most honoured. They would, for instance, in the case of a Cauliflower, choose one that was fairly compact, not one of large size that had the appearance of being gorged with manure or bloated with liquid.

The standards of the best class of country house, where the mistress is a good housewife, should be borne in mind; where the diameter of a Brussels Sprout must not exceed five-eighths of an inch, and no large, overgrown vegetables are allowed to come to table.

Of course such a standard could not be adopted as a general use, for the larger number of consumers require more bulk; but I much doubt whether anyone really wants the very large, over-fed examples. They merely indicate a certain skill in pushing the thing as far as it will go, the article when produced being relatively valueless.

Size frequently means false economy. A big Marrow fattens at the expense of the general output, and this truth has a wide application.

The fruit and kitchen garden is of growing importance in the economy of the household, and gardeners should take heed of the fact.

I give herewith the opinions of a few men whose judgment is worthy of consideration, and I thank them for their kindness in adding to my notes.

Mr. Beckett, the well-known grower and exhibitor of vegetables, writes:—

"Far too much importance is attached to size at the expense of quality and refinement; this, in my opinion, being equally noticeable in flowers, fruit, and vegetables, and except for appearance' sake has in many cases little to recommend it. Among the first named take the Rose. Many of the larger varieties are deficient in that beauty and refinement so noticeable in the smaller and free-flowering varieties, and when cut are not so attractive.

"Then again the Chrysanthemum. Though large massive blooms have their value, medium-sized highly coloured flowers are generally far more useful. For instance, the charming little Pompons are not so largely grown as they deserve, and many of the more beautiful Japanese and incurved varieties are discarded unless of mammoth size.

"Carnations are another instance in the same direction. Medium-sized sweetly scented varieties which contain all the attributes of a perfect bloom are much to be preferred to the larger and coarser ones.

"Dahlias again may be placed under the same heading in all sections, from the large show flower to the delightful little Pompon. Small and medium-sized blooms are better than the larger ones for all purposes except perhaps the show board, and the same applies to nearly all florists' flowers, such as Zonal Pelargoniums, Fuchsias, Begonias, Gloxinias, and many others which are in danger of being spoiled by the encouragement of mere size.

"Fruit, perhaps, is the most important of all in this respect. Far too

often the big tempting-looking specimens are worthless as compared with those which are smaller and less attractive, and until the public are educated more in this respect, so long will the producer continue to place these on the market. What we want to encourage are those varieties which are well known to contain all the attributes of high quality, and endeavour to produce them to perfection.

"The Grape is perhaps the most important of all fruits grown under glass in this country, and in Grape culture especially, only those varieties which possess the highest quality should be encouraged; there are plenty of good ones suitable for all seasons.

"Many of the larger and showy peaches are inferior in flavour to the smaller-fruited ones. And, indeed, the same applies to nearly all fruits, such as Strawberries, Figs, Apples, Pears, Melons, Gooseberries, Plums, Medlars, Cobnuts, and Walnuts.

"Though vegetable culture is generally regarded as the lowest grade in horticulture, it is certainly not the least important, and unless I am greatly mistaken the production of high-class kitchen garden produce will take a greater part in the future than it has hitherto done, and this can only be accomplished by educating the producer generally to a higher standard than has so far been the case.

"Young men who have made up their minds to become gardeners far too often consider that the details in connection with vegetable culture are beneath their notice, and can be acquired when they are placed in responsible positions as head gardeners—a sad mistake, which they often find out to their cost. I am perfectly convinced that there is no department in horticulture which demands more care, skill, and thought than this, if high-class vegetables are to be produced all through the year. Many vegetables which are offered for sale are really not fit for human food; and as with fruit so with vegetables: many of the products tempting to the eye are scarcely worth cooking. The selection of varieties is of the utmost importance, whether for private or market use, and in making awards at our exhibitions judges do not take into consideration the quality of the varieties as much as they ought. Large and coarse varieties should be rigorously excluded from all lists, as they are neither good nor profitable. Especially does this apply to Potatos, Cabbage, Savoys, Beetroot, Turnips, and many others.

"I am quite at a loss to understand why our market gardeners do not cultivate the better varieties, many of which are more prolific and quite as easily grown. For example, Peas and Runner Beans. It is almost impossible to get the first named fit to eat at any of our hotels or restaurants during the season; and why not grow the new and improved varieties, which are certainly vastly superior in every way?

"The highest system of culture should be the aim of the producer, whether it be flowers, fruit, or vegetables, of all the best known varieties, so that each specimen may be of the highest excellence."

Mr. Geo. Bunyard, V.M.H., of Maidstone:—"I certainly find that medium and small fruits have the best flavour, though in large fruits of Peaches and Pears you may get a softer texture, making them more digestible and more full of refreshing juice. My theory is that the flavour lies near the skin, and therefore it is a mistake to pare some fruits; they

can be eaten unpared, when home-grown, but when they pass through a market, or are kept in shops, this cannot apply.

"A Melon of 1½ to 2 lbs. is better than one of 4 lbs. or 5 lbs.

"A Pear of 4 to 6 oz. is better than one of 12 oz. to 16 oz. But the shows have stimulated a desire for size, choking out the very sweet and luscious smaller fruits as 'Belle Julie,' 'Comte de Lamy,' 'Winter Nelis,' 'Zéphirin Grégoire,' 'Knight's Monarch,' 'Thompson,' &c.

"In Apples a kitchen fruit cannot be too big, but the smaller and medium dessert varieties are far the richest, and for some reason the ill-formed fruits of Apples, cracked and russetty (and Pears the same), are mostly of richer flavour than perfect specimens.

"In Peaches, unless we get a fair size, the fibrous matter predominates too much, and they become tough or mealy, but an overfed Peach though full of juice is not so well flavoured as a medium-size one. Nectarines and Apricots the same. In Gooseberries the small-fruited ones are the best, far superior to the big Lancashire varieties, which, owing to their watery nature, are very liable to a chemical change in flavour. In Strawberries, though a big one is good, the smaller are far richer, and for real Strawberry flavour (not pine or sugar) the old 'Black Prince,' 'Viscountess Héricart de Thury,' and 'Keen's Seedling' are yet unbeaten.

"In vegetables, except Onions, I think the smaller examples are in every case the best.

"In flowers, the extra large blooms, to my mind, lack refinement, and double flowers are certainly not beautiful. The growth of taste in single flowers, as Roses, Asters (annual), &c., is a natural harking back to Nature and to beauty."

Mr. F. W. Burbidge, M.A., V.M.H.:—"There is a medium in all things, and neither the very largest nor the smallest of flowers are the most beautiful. The giants and dwarfs of the vegetable world may be curiosities, but neither can lay any substantial claim to beauty. The finest and most enjoyable of flowers are those of average size, and of perfect form, colour, texture, and fragrance, and in the gamut of excellency I should place mere size as being the last factor in any public competition. We do not want Roses as big as Cabbages, nor *Odontoglossum crispum* liver-spotted like a pointer dog's hide. Perfect form or shape, clear or pure colour, fineness of texture, and fragrance make up perfection in all flowers.

"The same remarks apply to fruits for eating raw, but here texture of flesh and exquisite flavour and aroma take first place; colour is essential, but mere size is the last needed factor. If size is any advantage it is in the case of fruits especially grown for cooking, where external colour disappears and flavour is frequently augmented by culinary skill. Blenheim Orange Apple is always beneath Ribston Pippin as a dessert fruit, just as Muscat Grapes and Frontignans are preferable to 'Gros Colmar' and 'Gros Maroc.'

"As in fruits, so in vegetables, the largest are rarely, if ever, so fine in texture, or so delicate and refined in flavour, as medium-sized specimens. The outer layers in both fruits and vegetables are more nutritious and delicately flavoured than the cores; hence the more outside there is

produced in proportion to the inner core, the better either fruit or vegetable must be. Equality in size is essential not merely for show purposes, but also for the market and kitchen as well."

Mr. Crook, Forde Abbey Gardens, Chard :—" Size is of less importance than flavour. There are exceptions, but, generally speaking, large vegetables and fruits have not the same quality as smaller ones. As an illustration, think of the large coarse Grapes, and such varieties as 'Lady Downes,' 'Black Hamburg,' and the Muscats. Then again the Pears, to wit 'Beurre Clairgeau,' 'General Todleben,' 'Grosse Calebasse,' 'Hacon's Incomparable,' 'King Edward,' and a host of others, against 'Winter Nelis,' 'Comte de Lamy,' 'Louise Bonne,' 'Seckle,' though I admit 'Doyenne du Comice' and 'Marie Louise' are good. Most of the large apples lack flavour, even for cooking, compared with such as 'Lemon Pippin,' 'Hereford Pearmain,' and the old 'Alfriston'; 'Blenheim Pippin' is good, but this is again the exception. Where are the apples that can be pitted against 'Cox's Orange,' 'd'Arcy Spice,' and 'Cockle Pippin'?

" Large vegetables are generally strong, coarse, and useless. The big Cabbage, Cauliflowers, Parsnips, and Carrots, which we see, are only fit for animals.

" No Pea excels 'Ne Plus Ultra.' In Melons again nothing is better than a medium fruit about 3 lb. to 4 lb. Fancy anybody sitting down to a big 8 lb. fruit, coarse and poor, but the prize was awarded at the Taunton Show for a collection which contained such specimens. Let us have things well grown (not forced) and of the best varieties and flavour first."

Mr. S. W. Fitzherbert :—" To my mind a good large thing is better than a good small one; but if in the large thing there is any falling off in quality, this at once lowers its value, for the primary consideration must be *quality* and not *size*. Unfortunately both in flowers and fruit undue size is often accompanied by inferior quality, which should at once debar the specimen from taking the highest honours.

" In comparing exceptionally large fruits with those of more normal dimensions it will more often than not be found that the former lack the flavour possessed by the latter, and judges should in this respect be guided by intrinsic merit, and not by the eye. Unfortunately fruiterers only think of the look, and one can hardly blame them, for the public demands rather what will please the eye than the palate, and will, as a rule, buy the insipid but extremely large and handsome 'Gros Maroc' Grape in preference to the luscious, but far less striking, 'Black Hamburg'; and it is the same with other fruit.

" With flowers extreme size means coarseness. Some maintain that size is in itself a demerit. With this view I am absolutely in variance. If with increased size the same perfection of form and colour is present, I consider the large flower the better, but if there is the slightest hint of coarseness, not shown in the smaller flower, the former should be deemed inferior.

" What is required in the production of new varieties of flowers and fruit is that size should be a secondary consideration to quality. If the quality can be maintained and greater size added, we are gainers. If with greater size quality deteriorates, we are losers.

" Of course in flowers the habit of the plant has also to be considered,

and even if the new flower retains all the beauty and refinement of the older varieties with the advantage of greater size, but by reason of the plant's growth fails to display them effectively, it is useless for garden decoration."

Mr. E. Molyneux, V.M.H.:—"Size when illustrating high culture cannot be deprecated. For instance, large Japanese Chrysanthemums show the natural form and colour of individual varieties, and for some forms of decoration, vases for large rooms, halls, staircases, &c. are valuable. For épergnes and table decorations generally, small varieties are more valuable as being in keeping with these requirements.

"Lily of the Valley, Arums, Roses, Geraniums, Cannas, Camellias, when large, are certainly more gorgeous than small blooms. For small vases, button-hole bouquets, &c., small flowers of high quality are desirable."

Mr. C. E. Pearson:—"The craving after size is a purely natural one, and not altogether to be discouraged unless other qualities are sacrificed. The only gross case on the other side which occurs to me is the practical exclusion of the 'Black Hamburg' Grape from the market by 'Alicante' and 'Gros Colmar.' These coarse fruits are only tolerable from December onwards when 'Black Hamburg' is out of season, but they now flood the market in September and October, when they are not fit to eat, and the Hamburg, the best of all grapes, is disappearing from *commercial* cultivation."

Mr. H. Somers Rivers:—"Big fruits are not necessarily poor-flavoured, but extra big specimens fed up and brought to unusual size often are.

"Ordinary good-sized specimens of 'Doyenne du Comice' Pear, often larger than one would care to tackle by oneself, are most excellent, also 'Princess of Wales' Peach. Very frequently, of course, the highly coloured Peaches are not to be compared in flavour to the pale ones; want of flavour in Peaches is often due to their being allowed to hang too long on the trees; also if the trees have been watered just before the fruit is picked, this will affect their flavour.

"'Gros Colmar' Grapes, if *thoroughly and properly* finished off, are of excellent flavour. One cannot judge this variety by the unripe fruit one usually gets in the market."

Mr. C. E. Shea:—"Save in the case of cottagers, who have to regard bulk with the view of meeting the, perhaps large, requirements of the family, 'size,' in fruits and vegetables, cannot, in my judgment, for one instant be held to make up for deficiency in flavour or quality.

"And in the case of flowers the same rule should prevail. It would surely evince a low standard of taste to estimate 'size' as to be preferred, or even to be equal in merit, to 'beauty and refinement.' Indeed, size in certain cases becomes a positive demerit. Take for instance *Aster ericoides*. Increase the size of the individual flowers fourfold, and the beauty of this charming Michaelmas Daisy would be gone. And how many of the most lovely and refined varieties of the Chrysanthemum have almost disappeared from cultivation in face of the demand for increased size and weight!

"'Size'—the demand for it—is undoubtedly the offspring of competitive exhibition. In theory each variety is, or should be, judged from

the standpoint of the highest potential of excellence of the particular variety, irrespective of its relative bulk, as compared with other varieties. But how few, save the more experienced judges, are able to withstand the influence of the 'heavy' stand of blooms, or the 'weighty' individual flower!

"And in the case of fruit how often mere size—and, I might add, also, mere colour—come to the forefront, and elbow to the rear the more modest-looking fruit, which, for dessert or culinary purposes, may far exceed in value its more bulky or showy-looking rival. And the mischief caused is far-reaching, for many persons not possessing real knowledge or experience of particular varieties are led—or rather misled—to select varieties for their garden which, save for appearance, are but of the second or third class for all practical purposes.

"It seems to me that, in effect, good and sufficient answer to your questions is already given in the 'Rules for Judging' issued by the Royal Horticultural Society. Therein 'flavour or quality' in fruits and vegetables, and 'beauty and refinement' in flowers, have allotted to them fairly just and proper values, as against mere 'size'; and I feel sure that if those who exhibit, and above all, if those who judge and make their awards on these exhibits, would but more generally acquaint themselves with, and carry out, these 'Rules for Judging,' the rage for mere size would receive a greatly needed check, and would speedily give place to a more intelligent and general recognition of what are, in fact, the true aspects of highest excellence—viz. in fruits and vegetables, *flavour and quality*; and, in flowers, *beauty and refinement*."

Mr. Owen Thomas, V.M.H:—"In most fruits there is no quality that the gardener makes more strenuous efforts to attain than size and weight. It is not size and weight which are at fault, but the securing of this quality at the expense of other essential points. Take a 'Queen' Pine for instance; whoever heard of one being too large? A 4 lb. fruit would have no chance against a 6 lb. fruit at an exhibition—*all other* points being *equal*. Thus considered, weight carries substantial advantages. But supposing all other points *are not* equal. Let us assume that the large fruit possesses an immense or crooked crown, out of all proportion to its size, some of the pips defective and badly developed, some portion of the fruit unripe, etc. Then in my opinion these defects reduce the value of the 6 lb. fruit below the 4 lb. one, presuming that the smaller fruit is free from the defects mentioned.

"Take a bunch of Grapes of any variety, say the Black Hamburg for instance. There is no point in judging this Grape that will carry greater weight with judges than berries of magnificent size. But in addition to good size, the bunch must be well set up, judiciously thinned, and above all well coloured, and have a perfect bloom. Size of berry counts for little if the bunch is defective in the points mentioned above. It is the same with many other fruits, but not with all. It is so with the Peach, the Pear, the Nectarine, and the Apple. It will thus, I think, be admitted that size, when allied to other qualities necessary to produce a perfect fruit, is much to be coveted. Whilst admitting all we have said in favour of size in fruit, the qualities that go to make a good fruit are much more frequently absent from the large fruits than from the medium-sized ones,

the reason for this being the greater difficulty in bringing about the same perfection of culture in a large fruit as in smaller ones. That the highest quality and flavour may accompany size, I need only refer to the 'Noblesse' Peach and 'Victoria' Nectarine, both of the largest size and unquestionably of the best flavour. And of Grapes take the Black Hamburg and 'Muscat.' These when well grown are amongst the largest in bunch and berry, and have few, if any, equals in quality and flavour. On the other hand take the Melon, the Gooseberry, and even the Strawberry, and some others in which I think great size would be counted a defect. It is seldom associated in these fruits with high quality and flavour.

"With regard to vegetables the considerations are not quite the same. Size and weight, when associated with other necessary qualities which go to make a perfect specimen in some, will always carry substantial advantages. Take Leeks or Celery for instance. The larger they are, provided they are well bleached, well hearted, and free from any signs of bolting, so much greater their value.

"On the other hand, if we come to Potatos, large size, even if accompanied by other good qualities, is a serious defect, reducing the value of the tuber considerably both for the home and the market. It is the same with many other vegetables, notably the Cauliflower, the Turnip, and the Cabbage, so that size and weight in individual samples of vegetables have not relatively the same value as in fruit. The goal to aim at in the growth of vegetables is the golden medium between the two extremes."

Mr. E. H. Woodall:—"The public demand first of all something that pleases the eye. However good a thing may be, or however excellent its flavour, still the ignorant buyer will prefer that which *looks well*. The only thing to do is to raise new fruits, and new varieties which shall not only look well, but taste well also. Put flavour into your Alicante or Colmar Grapes, and less manure and water to your vegetables, and the first step will have been taken. But first of all raise the taste of the buyer—it is even more the buyer's fault than the grower's, for the latter naturally must grow what will find a ready sale. The amateur world grows what it prefers, and only educates its eye and taste by experience, which seems the special need of the casual buyer.

"As to flowers, it is those who only take a passing glance who prefer the big things individually or *en masse*. Knowledge alone makes one appreciative of refinement of shape, colour, and habit; so it is to the art schools and the rising generation one must look for educating the eye for true excellence. It is too late for the present generation, I fear."

Mr. Wythes, V.M.H.:—"For years I have advocated more attention to quality, and not mere size, in both fruits and vegetables.

"Take vegetables: what value is there in huge Brussels Sprouts, compared to a small or a medium compact one—huge Cauliflowers as big as a pail compared to one of the size of a cricket-ball? One is strong, coarse, and nasty, the other delicate, a vegetable that an invalid can enjoy. Huge marrows, *i.e.* in a seed state, are worthless, whereas if cut young, and cooked whole, they are delicious.

"In a few cases fruits may not be coarse if large. They differ according to culture. Grapes, for instance, Peaches, Nectarines, Figs of certain varieties, if well grown, do not lose quality, but, on the other

hand dessert Apples if too large are not always of the best quality, and Pears also.

"There is far too much tendency to mere size in flowers. Take Chrysanthemums, for instance: these are, in many cases, far too coarse, and there is then a loss of quality. The same tendency prevails in other things. I think the beauty of the Carnation is lost when one bloom is grown on a plant that should carry a dozen."

Fig. 109.—Odontoglossum cirrhosum, 'Pitt's variety.' (*Journal of Horticulture.*)

(See p. lxxxviii)

GERMINATION OF AMARYLLIDEÆ.

By A. Worsley, F.R.H.S.

In the Journal of the Society, Vol. xxvii. pp. xxxvii, 852, &c. several notices and articles have recently appeared dealing with this subject. It has been my object to show that the process of germination is by no means such a simple affair as some have supposed, and is even now, perhaps, not thoroughly understood.

The first process which issues from the seed has been, by previous writers, termed the Cotyledon. I have preferred to call it "the Original Process," because I think that it will be quite soon enough to give it a particularised name when its complete functions are ascertained; and also because, as I have pointed out (Vol. xxvii. p. xxxvii), those functions which we can follow are quite distinct from the functions fulfilled by the Cotyledon in the Dicotyledonous Orders.

I have also striven to show (Vol. xxvii. p. 855) that the curvature of this Original Process, antecedent to the formation of any true roots, is not governed by any geocentric inclination, but by the law of "the survival of the fittest."

In my view the division of plants into Monocotyledons and Dicotyledons is too particularised. No such exact division exists in Nature.

We find the *one* organ—the Cotyledon—in every such seedling. In some cases it is simple (uncleft); in others it is sub-cleft (divided into two or more lobes.)

In *Crinum* it is simple, and consists of a fleshy mass surrounding the embryonic sac. In the so-called Dicotyledonous Orders it is usually sub-cleft into two lobes. But two lobes are by no means the maximum number; I have found three, and even four, to occur in some cases. As an instance I may cite *Senecio*. Out of a pan of forty seedlings of *Cineraria* (Hort.), I counted 36 with normal Cotyledon, five with three-cleft, and one with a four-cleft Cotyledon.

Also, among *Gesneraceæ*, I have noticed both in *Gloxinia* and *Tydæa* (*Isoloma*) many cases of three-cleft Cotyledons, and I have raised and flowered Gloxinias and Tydæas which not only had this peculiarity in their Cotyledon, but in the whole of their mature foliage, a whorl of three leaves being in every case produced in place of the usual opposite pair.

In the case of *Crinum*, it is easy to see how much is achieved by the removal of the Growing Point (in the tip of the Original Process) to some distance from the seed, but one great gain is that the putrid decay, which in time attacks the husks of these large fleshy seeds, should not involve the young plant.

I have attached (fig. 110) a drawing of a seedling of *Crinum Moorei* during the gestative period. The Cotyledon, simple in this case, is the fleshy mass surrounding the embryonic sac, and constitutes the bulk of the seed. From this issues the Original Process, consisting of an outer cylindrical process, and an inner leaf-like one. It is probable that through

both of these sustenance is conveyed to the young plant; certainly through the inner one, which shows more visible chlorophyll than the outer.

I have explained (Journal R.H.S., Vol. xxvii. p. 855) the cause which determines the curvature of this Original Process. A second curvature of the Radicle takes place so soon as the tip is sufficiently developed to sustain chemical reactions. At this period other "radial" roots may issue from the disc (or true root-stock) if such is sufficiently developed at the time. The whole of these roots shun light and dry air, and seek in the damp ground the physical and chemical conditions which they alone can convert to the use of the plant, and from this moment the Radicle becomes a true root and a specialised organ.

This second curvature of the Radicle may be of sufficient strength to influence the direction of the entire Original Process. It is interesting to observe the differentiation of function that takes place in the Original Process from the moment of issue until the apex becomes a root.

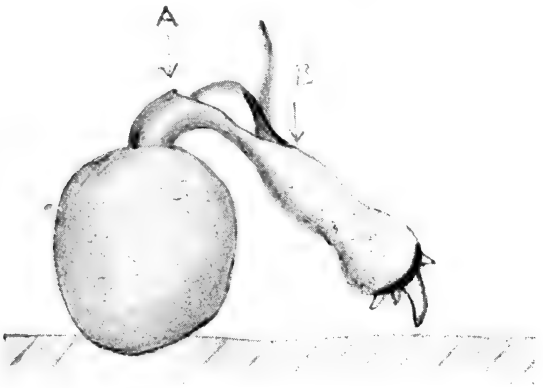


FIG. 110.—SEED OF CRINUM MOOREI, GERMINATING. LIFE SIZE.
The cylindrical cover of the Original Process (cotyledon of some authors) partly removed between the points A and B, so as to disclose the inner leaf-shaped process connecting the seed with the growing plant.

First of all it has to carry its precious, but at this period invisibly minute, burden—the Growing Point—from the seed to a safe distance, and, if possible, bury it in the ground. Then it suffers some arrest, or retardation of growth, until a young bulb has been formed out of the food stored in the Cotyledon. Then it undergoes a process of scaling or peeling, root-fimbriæ emerge from its apex, chemical action begins, and it plunges off again on a fresh errand, ready to provide the young plant with food against the period when it must be weaned from the almost atrophied tissue of the Cotyledon.

I have attached a short diary of observations (microscopic in part) made during the period under review, and explanatory of fig. 110.

Seed of 'Crinum Moorei' during gestative period.

Oct. 20. Emergence of Original Process.

Oct. 22. No signs of curvature, or of fimbriæ upon the apex, but microscope revealed presence of glands.

Oct. 24. Undoubted signs of curvature.

Oct. 26. Curvature very marked, but is taking place upwards, the apex again touching the surface of the seed. No fimbriæ visible. Removed one half of Outer Cylindrical Process, so as to watch Inner Process.

Oct. 31. No fimbriæ, and no sign of geocentric declension. Growth of Original Process arrested. Formation of bulb visibly begun. First monophyllous growth (first true leaf) issuing upwards.

Nov. 7. No change except in size of young bulb.

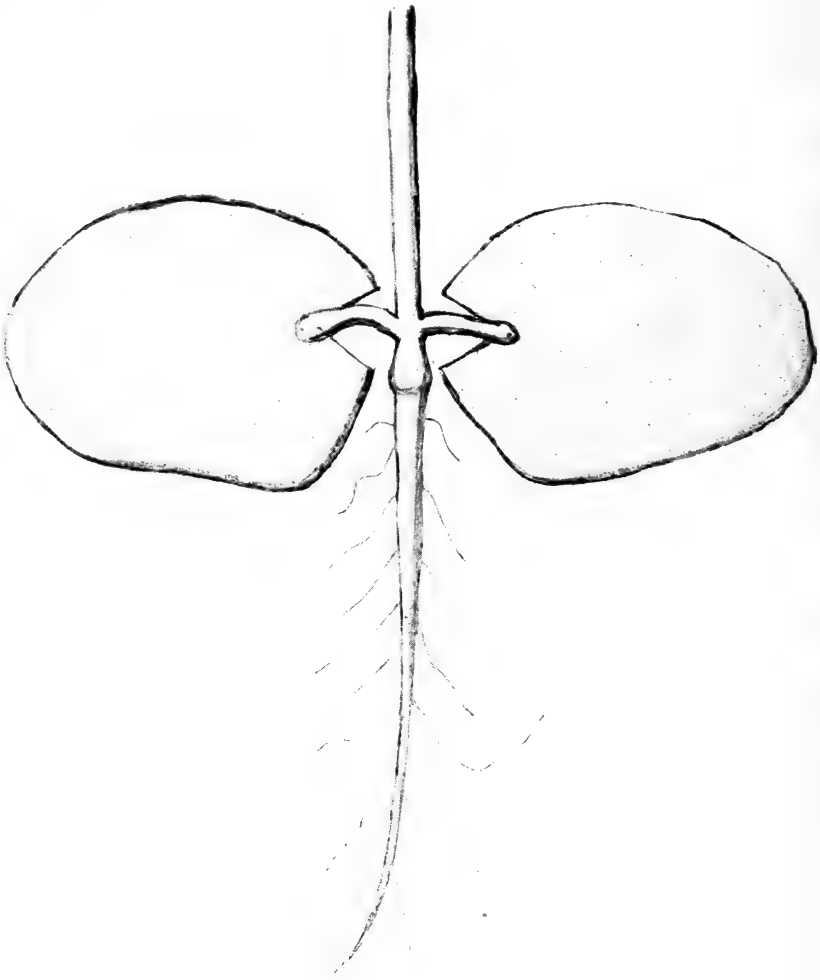


Fig. 111.—Cola vera, germinating. Life size.
The cotyledon spread out, showing minor lobation of each half.

Nov. 15. Young bulb nearly $\frac{1}{2}$ inch diam., with well-formed disc, from which four (radial) roots have issued, and are almost as long as the Radicle, which now extends $\frac{1}{4}$ inch beyond disc. The conical apex is peeling (or scaling), and, on such scales falling, root-fimbriæ are visible (under microscope) in process of formation. Radicle shows signs of geocentric declension at an abrupt angle from the general trend of the Original Process.

Note. Drawing was made at this stage. The subsequent process of growth is well known.

When I first brought this subject formally before the Scientific Committee of the Society I compared the Original Process of *Crinum* (as representing the Monocotyledons) with the Cotyledons and Cotyledon-stems of *Phaseolus vulgaris* (as representing the Dicotyledons), and exhibited live specimens of the seeds of both plants in the process of germination [Vol. xxvii, p. xxxix].

In *Phaseolus* there is no discernible process (or Cotyledon-stem) connecting the sub-cleft Cotyledon with the young plants; there is nothing visible that is in any way a counterpart to the Original Process in *Crinum*. However, in certain Sterculiaceous plants these Cotyledon-stems are both well developed and very clearly duplicated (*vide* drawings of *Cola vera*, figs. 111, 112).

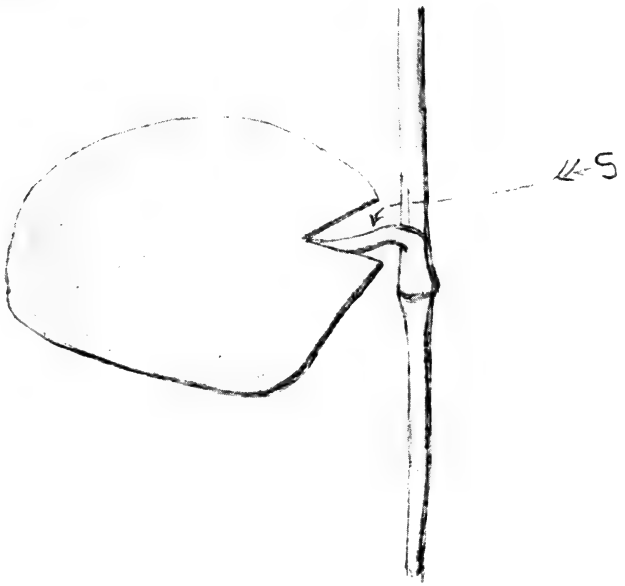


FIG. 112.—COLA VERA, GERMINATING. LIFE SIZE.
The cotyledon in its natural position, lobes superimposed.

Each half of the Cotyledon is, in this case, roughly cordate, and is sub-cleft again at the point of attachment. The duplicate Cotyledon-stems are $\frac{1}{2}$ inch long, and it is *this* process ("S" in fig. 112) which finds its counterpart in the Original Process of *Crinum*.

If we imagine the halves of the Cotyledon and of the Cotyledon-stems in *Cola vera* to become ankylosed to each other, we at once see before us the counterpart of the simple Cotyledon and of the Original Process of *Crinum*.

It is obvious that if the dual Cotyledon-stems of *Cola* were ankylosed, then the upward growth of the young plant would be compelled to burst its way through them (as in *Crinum*), instead of issuing between them.

The comparison is both interesting and instructive, and is complete as far as any analogy can be.

The Radicle in *Cola* probably becomes the taproot, and an organ vital to the mature plant, whereas in *Crinum* it is a temporary organ only.

PLANT VARIATION UNDER WILD CONDITIONS.

By Charles T. Druery, V.M.H., F.L.S.

With special reference to Professor Henslow's very interesting paper, pages 71–83 of the present volume, my experience in connection with the phenomena of variation in the British species of Ferns, which I have studied now for some twenty-five years, leads me to the conclusion that he, like many other botanists, is unaware of the great variability evinced under normal conditions of growth. Hence I venture to think that the following facts, cited on the opposite side of the case, may appropriately be set forth for the information of the Fellows of the Society. Owing to certain peculiar circumstances, there is, I believe, no family of plants other than Ferns which for at least half a century has been subjected to such careful search in wild habitats for those "sports" which form a class of varietal forms distinct from the smaller and merely individual differences which characterise most plants originating through seeds or spores. The results of such research have, moreover, during the whole period been carefully recorded with descriptions, localities, dates, and finders' names. Furthermore, the plants themselves, being perennial and of quite indefinite longevity, have mostly been preserved in a living condition, and exist to the present day in the numerous collections about the country. We have therefore not only a reliable record, but also a unique mass of living material, in addition to those herbarium specimens in our museums and elsewhere, which as a rule form the mainstay of the student, but are in many ways greatly inferior to the living examples, as subjects for reference. This being so, it is easy to verify the data upon which I base my theory as opposed to Professor Henslow's, which is:

1. That plants vary fully as much under purely natural, *i.e.* normal, conditions, as they do under culture.

2. That the "sports" discovered are not due in any way to change of environment or response to altered conditions.

3. That their diverse nature indicates a confirmation of Darwin's theory of indefinite variation in all directions, instead of Professor Henslow's that the variation is sympathetic with or responsive to the environment.

Before considering these three points, of which 2 and 3 are really varied forms of the same idea, I may point out that the prevalent notion that plants vary more under culture than under wild conditions is largely due to the fact that all plants under culture are placed under the most favourable conditions for the discovery of variation, while those under natural conditions are in precisely the opposite position. Plants under culture are as a rule under observation from their germination upwards, and they are grown in large numbers of the same species or variety together, so that any deviation is easily noticed.

Wild plants, on the other hand, grow as a rule intermingled with numerous other genera and species, and are moreover widely scattered

over large areas, and often in very unfrequented spots and places not easy of access. The difficulty of finding an abnormal specimen is therefore great, and demands the expenditure of much time and perseverance as well as travel. Another point is that the large majority of cultivated plants are already variants, so that there is an element of instability in their offspring which is well known to be apt to lead to the appearance of further modifications of the type. This tendency, however, must not be imputed to culture, since, as we shall see, it is just as inherent in wild "sports," and is simply an exemplification of the general rule that once a plant has broken away from the normal leading-strings as it were, *i.e.* has adopted an abnormal habit, its offspring are liable to vary still more, culture or no culture, though under culture those forms which thus originate, and which would possibly be too heavily handicapped to survive in the natural struggle for existence, are assisted by the cultivator, and thus artificially swell the number of his acquisitions.

Let us, however, now turn to the evidence afforded by Fern "sports" in support of the first clause of my theory. The latest published record of wild finds is that of Mr. E. J. Lowe, F.R.S. ('British Ferns and Where Found,' 1891). This record contains a descriptive list of distinctly characterised and constant "sports" either found wild or subsequently raised under culture from such finds up to the date cited. A considerable number of Fern-hunters and Fern-raisers appear in the list, and the latter for several decades have devoted their special attention to sowing the spores of the best wild finds with a view to improvement or extension of the type. We have therefore to deal with both classes of forms, viz. the original wild types and their descendants under culture; and what is the result? A careful analysis shows that out of 2,090 varieties named and described, no less than 1,360 were found wild, and 730 raised under culture.* Could any possible argument in favour of my theory be stronger or better substantiated? Nor must it be assumed for a moment that these numbers are exhaustive, especially of the wild varieties. The connoisseurs among Fern-hunters ignore innumerable forms which they regard as devoid of merit, but which nevertheless, from the point of view of permanent abnormality, are botanically as interesting as the *élite*.

So much, then, for proportionate variability under the two conditions. Now as regards the second clause, relating to change of environment and response to altered conditions, as the cause of variation. The great majority of the wild "sports" have been found growing under precisely the same conditions as the myriads of normal plants of the same species with which they are often intermingled, so that their very roots have to be disentangled from those of their normal neighbours. Hence their environment must be identical. Furthermore, they are found on rugged hillsides, on unfrequented moors, in deep ravines, &c., where obviously the same environment must have existed for ages, and yet the "find" may be of extremely abnormal type. How is it possible here to impute the variation to any change or any response to environmental impulse? How they originate we simply do not know, whether by bud "sport" or spore "sport" we cannot determine. Nevertheless, the subtle change introduced

* For full analysis of lists, see *Gardeners' Chronicle*, Dec. 19, 1903, "Variation Wild and Cultural."

is almost invariably a permanent one, and the plant, while retaining its naturally-acquired abnormal character thenceforth under culture, produces true offspring, or, if according to the aforesaid rule they tend to vary, the type is maintained, and is only extended or otherwise modified. It fulfils, in fact, all specific requirements.

Finally, their great diversity points to indefinite variation in all directions, and not to variation in any special direction in response to the environment. On one and the same hillside, with the same aspect, we may find foliose forms and depauperate ones; indeed, I once found two such side by side. Some "finds," too, have been discovered under conditions which indicated that had they not been found they would speedily have perished among their robuster normal neighbours, indicating an "injurious variation," which Professor Henslow states is not known to occur.

The above, it will be seen, are "facts," and not theories, except as regards the deductions made from them, which seem to me to be incontrovertible. Professor Henslow also speaks of indefinite variations as "occurring in the garden, not in nature at all," but in my opinion no such line can possibly be drawn. Practically the sole difference between a garden and wild habitat is that in the former man steps in as a selective and protective factor, while in the latter Nature alone selects, the principles underlying variation being absolutely identical in both cases, since organic phenomena in both situations follow precisely the same natural laws.

With reference to the power of further variation in wild "sports" to which I have adverted, an instance recently came under my own observation. A Hart's-tongue was found in Cornwall whose fronds, otherwise normal, were divided into several points at the tips, while the usually heart-shaped pair of lobes at the base were lengthened and dilated or forked at their tips, constituting a "sagittate" form. Sowing spores from the wild find sent me, I obtained a large batch of plants, the large majority of the parental form, but seven or eight, all alike, had dense heavy crests at the three terminals, and the fronds so shortened as to be triangular, with the three bunches closely approximated, and two others were simply round balls of cresting on bare stalks. Several of the first kind are also studded with bulbil plants on the frond faces. All the batch developed in one and the same pan, *i.e.* under the same environment exactly, and all the spores were, as stated, already developed on the wild frond.

Another point of Professor Henslow's paper also clashes materially with my experience. He says on page 73, "moreover, the destruction, when variations are supposed to arise, to which Darwin refers, *takes place in infancy only*: that is, *before* any varietal or specific characters as a rule exist; because if the individual reaches maturity or the adult stage, as when flowers or fruit are borne by plants, such have been thereby 'selected' so that any 'beneficial or favourable characters,' which Darwin supposed to be able to determine the survival, are *non-existent when the destructive period occurs*."

The italics are Professor Henslow's own, and constitute precisely the points I contest. In raising Ferns from spores, the varietal and specific characters are manifest even in the primary fronds produced from the prothallus, and abundantly so in those subsequently produced, long before

they reach the adult stage. The result is that any advantage possessed by a variety or species in the way of robuster or quicker growth gives it a material advantage over its associates even in its infancy, and it is a common occurrence for the thus favoured occupants of a pan of a mixed sowing, to overgrow and destroy their fellow sporelings of a less assertive character, unless these be removed to another pan. Hence it is quite obvious that the struggle for existence does *not* take place *before* any varietal or specific characters exist, and that 'beneficial or favourable characters' *are existent* when the destructive period occurs.

The seeds of Phanerogams also undoubtedly show their specific, varietal, or constitutional differences at an early stage of development, and consequently my Fern experiences form a fair parallel and not an exceptional case.

MEDIÆVAL MEDICINE.

By Rev. Professor G. Henslow, M.A., V.M.H., &c.

It would be out of place to attempt a complete lecture on the history of medicine, so all I propose doing is to give little more than some examples of the healing art of the Middle Ages and try to discover the why and the wherefore of the methods pursued.

The "Dark Ages" covered the period between the ninth and twelfth centuries, and from the latter to the sixteenth, when printing had been invented, arts and learning, if not science, were beginning to turn to the light again.

Medicine, however, had little or nothing fresh to add to ancient lore. It was built entirely upon the past. The Greek names, as Æsculapius, Hippocrates, Dioscorides, &c., were held in reverence, and their remedies persistently copied; but the Arabians had almost monopolised the knowledge of medicine during the Middle Ages, and the Greek school of Salerno in Italy, saw the revival of Greek medicine under Arabian auspices.

In the earliest days, as with modern savages, diseases were regarded as supernatural. In Homer, sicknesses were said to come from sins, just as Job's comforters believed his afflictions were heaven-sent.*

The frequent use of Biblical expressions in charms appears to point in the same direction; and lastly, the astrological nonsense, so conspicuous in Culpeper's works, shows much the same thing in another dress.

In Homer, Æsculapius was a Thessalian chieftain who was skilled in the knowledge of drugs; but he came subsequently to be regarded as the god of medicine, as early as B.C. 770.

Hippocrates was born in B.C. 460. He was a true scientist and physiologist, as far as it was possible. He insisted upon observing, and rejected the supernatural element; so that every disease, according to him, has a natural cause. He was consistently honest in his practice, and detested all quackery.

His good, common sense, however, disappeared from medicine in the ages of darkness, when all kinds of superstitions were mixed up with it.

At this period Salerno was rising into celebrity as a university for arts, to which medicine was subsequently added. Its most flourishing period was A.D. 1000–1200.

The most famous work of the school was entitled 'Regimen Sanitatis, Schola Salernitana, vel Flos Medicinæ,' a poem of 360 hexameters, dedicated to Robert of Normandy, son of William the Conqueror, who stayed at Salerno to be healed of a wound.

Much stress was laid on hygiene and avoidance of insanitary

* Are not all sicknesses "heaven-sent," in the sense that they are the consequence of the infringement, conscious or unconscious, by oneself or by others, of one or other of the laws which God has imposed upon all parts of Nature?—Ed.

conditions, and in this the school followed Hippocrates; and Salerno was consequently called the "Hippocratic city."

Perhaps Longfellow's words—

> Joy, temperance, and repose
> Slam the door on the doctor's nose

were a free translation from the "Regimen":

> Si tibi deficiant medici, medici tibi fiant
> Hæc tria: mens hilaris, requies, moderata diæta.

Medical books, *i.e.* apart from surgical works, of the fourteenth century consist of recipes, of which the following peculiarities may be noticed.

An immense number of plants were used for their supposed virtues, but very few are still retained in modern pharmacopœias. The probable reason for their employment was, *because* a patient got well after using some drug, *therefore* that drug must have had the power to cure him, and as he got well when the same drug was used for a variety of complaints, therefore the said drug became a specific for a great variety of diseases.

Thus we find Pliny giving the Cabbage credit as a remedy for some twenty-five complaints; but it is scarcely likely that it had curative powers for any one of them. Again, Betony is credited with some twenty virtues, among which it is said: "Whoso beareth betony, the palsy shall not come at him; if thou eat betony fasting, thou shalt not be a-venomed that day; thou shalt not be drunk that day."

A peculiarity of many recipes is the extraordinary number of drugs included in one and the same prescription. Thus of a medicine called "Save,"* in two recipes, one contained forty and the other fifty-one ingredients. It is not clear why it was so. Perhaps each had been good for wounds; so the physician thought one or two out of the number *might* be effectual; or perhaps the fee depended upon them, and he increased the number accordingly. This second suggestion finds its counterpart in Babylonian practice; for Professor Sayce tells us: "It is only occasionally that the names of special gods are introduced [into the penitential psalms], and then a long list of them is sometimes given, in the hope that among them might be the divinity whose anger had been excited, and whose wrath the sufferer was eager to appease." †

Fees may, however, have been an underlying motive; since as they copied ancient medicines they may have tried to follow the advice of Ben Solomon in his 'Physician's Guide': "Treating the sick is like boring holes in pearls, and the physician must act with caution lest he destroy the jewel committed to his charge." "Make your fees as high as possible, for services which cost little are little valued." Another example:

* This drug is mentioned by Chaucer in *The Knightes Tale* (lines 1853–56):

> 'To othre woundes, and to broken armes,
> Some hadde salves, and some hadde charmes,
> Fermacyes of herbes, and eek *save*
> They dronken; for they wolde here lymes have.'

† *The Religions of Ancient Egypt and Babylonia*, p. 417.

"Suppose you know nothing, say there is an 'obstruction' of the liver. Perhaps he will reply, 'Nay, master, it is my head or legs that trouble me.' Repeat that it comes from the liver; and especially use the word 'obstruction,' for patients do not understand it, which is very important." *

Regardless of the statement of Hippocrates, the belief in demons and evil spirits lingered on through the ages, so that many drugs had the virtue of expelling them. Thus the common St. John's Wort (*Hypericum perforatum*) was also called *Fuga dæmonum*, and "was gathered on the eve of St. John's day, June 21, to be hung up at windows as a preservative against thunder and evil spirits, and given internally against mania." †

The habit of making drugs as nauseous as possible, especially as emetics, appears to have had the same origin, viz. to expel the demon of the illness by making its internal abode as unpleasant as possible.

The desire for having the medicine "strong" originated in the same way.‡ Another method of driving out the spirit was by pommelling the patient vigorously. Modern massage is a refined method derived from the ancient practice. Fumigation with detestable odours was also practised. This is mentioned in the Book of Tobit (ch. viii.) when his son Tobias took the "ashes of the perfumes, and put the heart and the liver of the fish thereupon, and made a smoke therewith. The which smell when the evil spirit had smelled, he fled into the utmost parts of Egypt." Thus he saved himself from the fate of his wife's previous seven husbands, whom the spirit had slain.

Charms and incantations have always played an important part, and the question arises, what was their origin?

The word "charm" is derived from the Latin *carmen*, a song, and "incantation" from *canto*, "to sing," and it is to music and singing to which they are, at least in part traceable, for "music hath charms to soothe the savage breast." It was the soothing influence of a gentle musical voice which probably was found to have a beneficial effect on the patient, just as a lullaby sends a fractious baby to sleep.

Prayers, too, were probably another source. The Hebrew words for "charming" signify "soft whispering," as of prayers uttered in a low voice, the same word being used for prayer (Is. xxvi. 16) as for charming serpents (Ps. lviii. 5). Then it would seem that subsequently superstition placed the charming power in the mere *words* instead of in the musical accent of the *voice*; and that words of "magical songs" were engraved on gems and jewels, and worn on persons as "charms" or "amulets" (an Arabic word signifying "carried"). They not only "enchanted" but averted the effects of the "enchantments" of others; and so the superstitious uses spread and were enlarged.

Charms and incantations have been grouped under seven kinds, as follows:

1. Those addressed to the herbs themselves or the spiritual beings supposed to preside over their virtues: *e.g.* to Betony, Henbane for gout,

* *De Cautelis Medici*, fifteenth century; Withington, *Medical History from the Earliest Times*, p. 230.

† Prior's *Popular Names of British Plants*, p. 195.

‡ A physician in Egypt instructed an Arab how to take Seidlitz powders which he gave him; but as *one* did not seem "strong" enough, the patient took *four* of each paper at once!

Mugwort to prevent fatigue, a spray being held in the hand or put into the shoe.

2. Prayers were uttered while collecting the herbs. This was a custom of antiquity grafted on to Christian practices. In a writing by Apuleius (probably of the fourth century) called 'Herbarium, sive de Medicaminibus Herbarum,' "the names of herbs are followed by prayers and incantations to be recited on gathering them, a habit handed down, perhaps, from the old Greek or Tuscan herbalists; but the monkish transcribers have converted them into Christian by the simple process of slightly altering these prayers," often "replaced by the Creed and *Paternoster*, which the canons of the Church declared might alone be repeated on such occasions." *

3. As early Christianity became tainted by paganism in many ways, medicine was by no means exempt. Thus, in the custom of praying to Latona and other deities at the birth of children, the gods and goddesses were replaced by saints.

Numerous forms of quasi-prayers were uttered as charms by the physician and other attendants. But in the fourteenth century, and probably before that time, the prayer had been apparently repeated orally by persons who, not knowing what the words meant, had rendered them absolutely meaningless. For example: *Arcus forcior super nos sedebit semper Maria lux et hora sedule sedebit nator natoribus saxo*, &c.; these words being about a fifth of the whole charm, ending with the direction, "Say this charm thrice and she shall have child soon, if it be her time."

Another is: "Say *Quicunque vult* (the Athanasian Creed) thrice and all the Psalms over her."

4. There were forms of incantations used for exorcising the evil spirit which causes the disease itself; such were thus: *Fuge, fuge, Podagra*, &c.; "Fly, fly, Gout, for Solomon is coming after you!" †

5. Narratives or short stories embodying the account of someone who suffered in a similar way, often of saints or Scriptural persons. Thus, for example, the following is a charm or prayer for the toothache:—

"O blessed Apollonia, the noble martyr, who withstood the tyrant. In the first place they dragged her and tied her strongly. Then, when they broke her teeth with iron hammers, prayed during that torment. Whosoever may call upon thy name when in torment on account of toothache will not feel the pain. Pray for us, O blessed Apollonia."

6. The following is a sort of charm-amulet against loss of memory:— "Marchus + Mathew + Lucas + Johannes. Qui portat ista nomina super eum, nunquam carebit memoria."

7. As words became charms, so to have a sacred word engraved on a stone or other object became a charm and was worn as an amulet.

As an example of the supposed value of mere words is the following: "For the goute-sayne [*i.e.* cure] take the root of Ache and write thereon 3 words +IHS+XT+Dominus+, and as long as he be right

* Withington, *Medical History from the Earliest Times*, p. 177.

† Prayers, charms, and magical texts of similar import are found in the ancient Chaldæan literature and fully described by Professor Sayce, *Hibbert Lectures*, 1887, p. 317, *seqq*.

[*i.e.* exactly fixed] on him about his neck, if he have good belief on God, he shall never have it any more all his life."

The practice of suspending models of healed limbs in the heathen temples was adopted by Christians, as may be seen in foreign churches on the Continent to this day.

The first important Christian writer on medicine was Aëtius of Amida on the Tigris (A.D. 527–565). He is the first to mention Eastern drugs, such as cloves and camphor; and he it was that invented the name "Lign-aloes" for a wood of a tree * of the East, because it was bitter like aloes, hence the term "Wood-aloes."

A medical writer contemporary with Aëtius (of the sixth century) was one who strongly advocated the use of charms and amulets. Thus: 'An amulet for quartan ague which I have proved by many experiments. Take a live dung-beetle, put him in a red rag, and hang him round the patient's neck. For epilepsy take a nail of a wrecked ship, make it into a bracelet, and set therein the bone of a stag's heart taken from its body whilst alive; put it on the left arm; you will be astonished at the result.'†

Potatos (introduced in the 16th century) are to this day not infrequently carried in the pocket by Englishmen to keep off rheumatism!

Aëtius's work is distinguished by its long list of complicated prescriptions, and he was the first to introduce Scriptural phrases; thus, if a patient had a bone in the throat the physician was ordered to say:—"Bone, come forth, like as Lazarus from the tomb and Jonah from the whale." Then the physician should seize him by the throat and say: "Blasius the martyr saith, 'Either come up or go down.'"

Not only were very complicated recipes characteristic of the fourteenth century, but St. Blasius still seems to have ruled the throat. Thus for the swelling of the neck the recipe is: "Make a vow to Saint Blase and mark thy neck with a thread, and make a candle so long and offer it to an image of him."

The idea of evil spirits causing diseases is very ancient. Thus, in Persia, the evil deity Ahriman created by his evil eye 99,999 diseases, apparently in the form of demons. To cure these there were three kinds of doctors—knife-doctors, herb-doctors, and word-doctors, apparently comparable to surgeons, physicians, and priestly healers by the Holy Word. "He is the healer of healers, and benefits the soul also." ‡

With regard to the astrological theory of diseases and cures it apparently arose from the ancient custom—as in Egypt—of placing different parts of the body under the protection of special divinities. Thus, in head affections the supposed demon was told that he was attacking, not a mere mortal, but the great god Ra himself, and that he had better escape speedily to avoid the wrath of the deity, just as the gout had to fly before Solomon. This doctrine passed by way of the Gnostics into mediæval medicine, the pagan gods being replaced by Christian saints and partly by the heavenly bodies, especially the planets and signs of the zodiac.

The most remarkable instance of the persistence of these curious assumptions is seen in Culpeper's 'Herbal,' first published in 1653. It has

* *Aquilaria Agallochum.*

† Quoted by Withington, *op. cit.* p. 131.

‡ Withington, *op. cit.* pp. 35–6.

gone through many editions, and is still published at the present day. I am informed that, of two editions, the smaller one has been sold at the rate of about 1,370 copies per annum for the last *fifty years*, and a larger one at about 200 per annum for the same period.

The theory of *likeness* appears to have been applied even to the signs of the zodiac, as the two following specimens of Culpeper's teaching shows.

"Under *Aries* [the Ram] are born men of thick hair, white or yellowish, curling; long visage, crooked nose, short legs, little feet. The first fifteen degrees give a more gross body than the later."

"Under *Taurus* [the Bull] are born men of short and thick stature, big broad men, high forehead, wide nose, great mouth, fat short neck, dark ruddy colour, short arms, thick hands, thick black hair, short legs; slowe to anger, but if once angered, hardly ever pleased again."

Galen, who lived from A.D. 131–200, appears to have regarded drugs as divisible into four groups, hot, dry, cold, and moist; and then subdivided these into four degrees. This method of regarding drugs was held well into the eighteenth century, if not later.

The belief in the virtues of natural objects was largely based on signatures. That is, because they seemed to represent the *form* or *colour* connected with certain diseases, therefore such parts of plants &c., were especially intended for the use of healing; hence the stony fruits of Gromwell were good for stone; the yellow juice of Celandine for jaundice, &c.

An anæsthetic drug for surgical purposes is mentioned by Pliny, in writing on the Mandrake, as being "given before incisions or punctures are made in the body in order to ensure insensibility to the patient." *

In the Middle Ages, a drug called "dwale" is described, composed of Mandrake, Opium, black *Solanum*, Henbane, Hemlock, Bryony, Lettuce, with the gall of swine and vinegar. "Then let him that shall be cut sit near a good fire, and make him drink thereof till he fall on sleep. And then men may safely cut him; and when he hath been served fully and thou wilt have him to wake, take vinegar and salt and wash well his temples and cheeks and he shall awake anon right." It is difficult to find any account of its actual use; the drug seemingly being quoted by sixteenth-century writers as only having formerly been employed. The latest was Vigo, an Italian surgeon (lived 1460–1517 ?), who describes the Mandrake, using the words, "when *we will* cut off a member without feeling it, &c."; but adds there is "great danger" in its use. Possibly this was the cause of the disuse of dwale. The Deadly Nightshade is now called Dwale.

Strong vegetable perfumes were believed to be antiseptic and to neutralise the poisonous properties of the plague. Thus in 'Loimologia,' published in 1720, a treatise on the plague of 1666, among other remedies are aloes, cinnamon, myrrh, cloves, mace, mastic, &c.

The contagion was thought to be due to an *aura* resulting from the corruption of the "nitrous spirit of the air." Hence the recommendation is made that "such things ought to be used as exhale very subtile vapours, as the spicy drugs and gums. Such drugs as are from a vegetable production and abound with subtile, volatile parts, are of service

* *Nat. Hist.* bk. 25, c. 94.

to be exhaled into the air this way." Linnæus, writing in 1776, says: "Sweet-smelling plants as Wood-roof, when chewed, preserve people from infectious disorders."

Lastly, it has been found that the bacillus of typhus was killed by air containing the vapour of oil of cinnamon or oil of valerian in forty-

Fig. 113.

Κύων ἀνασπῶν Τὸν μανδραγόραν ἔπειτ' ἀποθνήσκων.

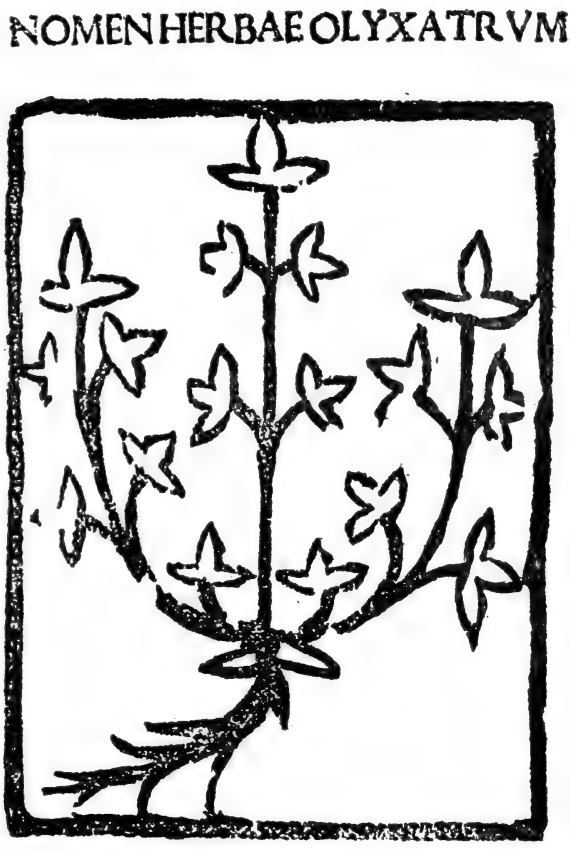
Dioscorides receiving a root of the Mandrake from the Goddess of Discovery.

five minutes; the bacillus of tuberculosis required twenty-three hours for the oil of cinnamon &c. These experiments appear to corroborate the ideas of our medical forefathers, who were wise in their generation, but knew nought of microbes.

Holy water was often used, apparently as equivalent to a charm. Thus as a remedy against the bite of a mad dog: "Take the seed of

flax and stamp it and temper it with holy water, and give it him to drink."

The following is a remarkable remedy: "For an adder or snake that has crept into a man's body. Take a fat loin of veal and roast it, and take a panful of sweet milk, somewhat warm, and set it on the ground. Then hang the man by the feet, so that his mouth be but little above the flesh, and let him open his mouth that the savour may go up into his body; and look that there be nobody in the house but hidden behind



From *Herbarium Apuleii Platonici.*

Fig. 114.

something; and let each of them have in his hand a besom; and they shall see the vermin come out and bite the flesh, and afterwards go to the milk and drink. Then let them be ready and slay it. Do so till all be out, and afterwards give him good drink till he be whole."

Illustrations by means of which the plants could be identified which supplied drugs were early recognised as valuable additions to the verbal descriptions of them.

A MS. of Dioscorides' work, now at Vienna, is probably the earliest existing example, being of the fifth century of our era. One illustration

is here reproduced. It represents Euresis, the goddess of discovery, handing a mandrake to Dioscorides, and pointing to a dog, doubtless explaining how it was concerned in extracting the forked root, represented by legs in the picture.

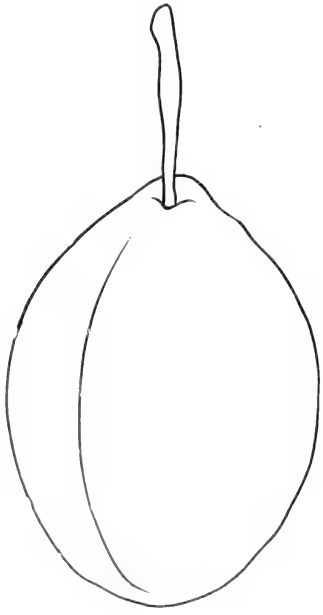
Josephus, in his 'Wars of the Jews' (lib. 7, cap. 6), describes the process:—"There is one way in which the taking up of the root can be done without danger. This is as follows: They dig all round the root, so that it adheres to the earth only by its extremities. Then they fasten a dog to the root by a string, and the dog, striving to follow his master, who calls him away, easily tears up the plant, but dies on the spot; whereat the master can take this wonderful root in his hand without danger."

The root was supposed to shriek, as mentioned more than once by Shakespeare; but, as the late Dr. B. W. Richardson showed, it was the shriek of the *patient* which somehow got transferred to the plant! Josephus adds that the great use of this plant is to dispel demons, who cannot bear either its smell or its presence.*

The first *printed* illustrations are to be found in German works, excepting the *Herbarium* of Apuleius Platonicus, which was printed at Rome *circa* 1480. Fig. 114 is an example from this book which may be compared with Fig. 113. The MS. was probably of the ninth century. The drawing † exemplifies the last and most degraded state of Roman pictorial art, for that given above is far superior.

* Quoted in Daubeny's *Roman Husbandry*, p. 275.

† This plate and information are taken from Dr. J. F. Payne's essay on the *Herbariums and Hortus Sanitatis*.



ON THE PRUNING OF ROSES.

By Monsieur Viviand-Morel.

"The Pruning of Roses" is a matter eminently calculated to produce ennui, and is a subject which has been discussed so often and over and over again since Columella and Palladius that in approaching it one fears to provoke the dictum "Non bis in idem."

I have been told that it was an ass which showed the Athenians how to prune the Vine, and since that remote time the Vine-growers of Sparta, having been educated in the nursery gardens of Attica, set to work to prune, not only Vines and fruit-trees, but shrubs of all sorts and kinds. The massacre of the Innocents dates not only from the birth of Christ, but long before the Christian era, I am sure, they pruned the great mass of plants growing in their gardens atrociously. And if I am asked why I thus impugn the gardeners of Bœotia, I reply that I arrive at that conclusion in the following way: "The gardener," said Pascal, "is a being who learns continually and lives for ever": from which I argue, since many prune very badly to-day, imagine how those others must have done it, three thousand years ago. But let me begin with an outrageous query: Do you wish to weaken a tree or any shrub? Then prune it! And if you doubt this axiom of vegetable physiology make the following experiment:—Plant two exactly similar Rose-bushes, of the same variety and of about the same weight, in the same soil. The next year prune one of them and leave the other alone. Two years afterwards prune the same one again and once more leave the other. Three years afterwards weigh them both, and you will be much astonished to see that the pruned Rose weighs much less than the unpruned one. A long time ago I wrote the following, and I do not wish to recall a single line of it at the present time:—

I had a Noisette Rose, 'Aimée Vibert,' budded on a 2 mètres high stock of *Rosa canina*, which in six years attained a diameter of $2\frac{1}{2}$ mètres: that is to say, it grew to be nearly 8 mètres in circumference. M. Duchet has a Rose of the same variety which covers the whole of the front of his house. These two Rose-trees grew to such a size only because they had been very little pruned.

There is in the Botanical Garden at Lyons a clump of Hybrid Perpetual Roses of the variety 'Victor Verdier,' which has been planted for twenty years. On this clump Lafontaine exercised his skill as a pruner for several years, and after him several other gardeners did the same, and the clump now is slightly thinner than when it was first planted. This is the result of twenty years of close pruning.

Here, then, we have examples of 'Aimée Vibert,' little pruned, which grew to an enormous size, whilst 'Victor Verdier,' regularly pruned every year, remains poor and sickly. Does not that prove that pruning checks, to a certain extent, the natural growth of Roses?

But until we have compared two Roses of the same variety we cannot

decide with certainty. However, it is highly probable that if the clump of 'Victor Verdier' had been left to itself it would now have presented an inextricable confusion of slender branches, dead wood, and at the season of flowering numerous blossoms of wretched quality. On the contrary, if M. Duchet had exercised his skill as pruner on his beautiful 'Aimée Vibert' it is highly probable that it would not have covered the whole front of his house. Nevertheless, it may be inferred that pruning acts as a check to all Roses.

But if pruning impoverishes Roses, someone else will tell you that not pruning does so equally, considering that a Rose left to itself covers itself with blossoms, thus weakening the branches, which end by dying from exhaustion. And this other person would be right.

Pruning weakens Roses, non-pruning weakens them also. I leave these two conclusions to professors of logic, who may draw from them what inferences they can; but before starting upon the practice of pruning, let us inquire a little as to the utility of what everybody practises. Without going back to the Deluge we have in an accessible form the very careful trial which Monsieur J. P. Vibert, the famous Rose-grower, undertook in 1830. The following passage relates chiefly to Bengals and Noisettes:—

"Their pruning consists in removing diseased and awkwardly-placed branches and in shortening others, according to the nature of the species or variety, the number of flowers that it produces and the ease with which they expand, and by several other reasons which can only be determined when actually at work upon the plant itself. In some varieties of Noisettes, which blossom shyly and only produce a few shoots, the principal object of pruning is the encouragement of the growth of flowering branches; some varieties indeed are so stubborn that besides being obliged to cut them back it is also necessary to prune or pinch them several times during the summer to force them to flower. These varieties are all very vigorous, and, having nothing to fear from being planted in the open air, their cultivation in pots is unnecessary.

"Bengal Roses do not spread; it is a characteristic peculiar to themselves; but they have, in a higher degree than other species, spreading or not, the peculiarity of developing either from a cutting or stock such vigorous branches as would, if not checked, soon weaken the neighbouring branches, and eventually cause their destruction. It is better not to entirely remove these rank growths, but to prune them back to a certain number of eyes, so as to force the stem to a more equal distribution of its sap. As a rule, in pruning all Roses, it is important to remember that the natural renewal of those branches which come from the cutting or root-stock is necessary to the plant's existence, and that their suppression checks the flow of the sap and arrests the plant's growth. When it is absolutely necessary to prune these branches rather severely, which often happens with Bengal Roses and Noisettes, the wounds must be closed with budding wax."

De Denis Helye says: "Roses which are wide-spreading and have long shoots should, as a rule, never be pruned, as this will sacrifice the blossom of the year, as for example in the case of the Banksian Rose, in which the flowers are produced on the wood of the preceding year. If

Roses are too vigorous, it is enough simply to decrease the number of shoots, but taking great care to preserve enough of them to replace worn-out branches, in order to make a well-balanced plant for whatever place it is destined. The twigs of these reserve shoots should be pruned to the length of 10 to 20 centimètres. This system of substituting vigorous branches for exhausted ones, as well as leaving little shoots, should be used for spreading Roses in general.

Dr. Barnier says as follows: "It is necessary to prune every year, and almost without caution; the more you prune a Rose the longer it will last, the more flowers it will give, the more the time of its flowering can be varied. The pruning is very simple. There are two methods, according to whether you want many flowers, or fewer but larger ones and more symmetrically placed on the bush.

"The master to whom we were apprenticed, Monsieur Liabaud, some time ago, asked the following question: Is there any real theory as regards the pruning of Roses? One might almost doubt it on seeing different gardeners operating, each in his own particular way. Some advocate training them along the ground like certain soft-wooded plants and forming a carpet, as in the case of Petunias, Verbenas, &c.; others cut them every spring level with the ground, like the annual stems of sundry perennial plants; others remove, every year, the last year's shoots, cutting back the new growth more or less. If one considers their manner of growth, this last plan may perhaps be the most rational; for, as it grows stronger, the Rose every year makes stronger shoots, which develop from below those of the preceding year. It is for this reason that Briers which grow in the woods take three or four years to make stocks strong enough to be budded as standards.

"To sum up, I think that it is always necessary to renew a Rose bush by cutting out the old branches of three or four years' growth which are used up, are not getting any bigger, and will die in a short time. Long or short pruning depends on the strength of the plant; some of the weak branches, when they do not reach beyond the cut ends of the strong ones, should not be shortened, because the terminal eye which receives its nourishment from the whole circumference of the branch gets much more sap than the lateral eyes, and very often gives finer flowers. The necessity of removing the suckers from the wild stock on which Roses are budded should never be forgotten, as they almost always grow more strongly than the budded plant."

Joseph Schwartz, a pupil of J. B. Guillot, who enjoyed a great reputation as a Rose-grower, was also an advocate for pruning Roses.

The month of March is, without exception, the time to prune all varieties of Perpetual Roses (by Perpetual Roses are meant those which blossom more or less all through the summer and autumn): that is to say, garden varieties placed in the following classes: Bengals, Teas, Noisettes, Hybrid Perpetuals, Bourbons, &c. One can begin pruning the hard-wooded varieties about the middle of February, especially if the winter is not a severe one; for example, Hybrid Perpetuals, Portlands, Perpetual Mosses, &c. But with varieties derived from Indian species, such as Teas, Bengals, Bourbons, &c., pruning should never take place in our part of the world before the month of March.

The growth of the Perpetual Roses is somewhat after the manner of that of the Vine, which one is obliged to prune to render it fruitful and make it produce finer fruit. So is it necessary to prune the Rose in order to obtain fine flowers and a well-shaped bush. An unpruned Rose grows out of shape, sprawls, exhausts itself, and gives much smaller flowers than those it is capable of producing.

As to pruning, strictly so-called, it is almost impossible to lay down any strict rules, because everything depends on the vigour of growth of the particular object under treatment.

A very intelligent gardener from Lyons, named Picard, who suggested a particular method for the growing of Roses, thus expresses himself as regards pruning:—

"I will not discuss the views of those who insist that periodical and regular pruning is indispensable in the cultivation of all plants: for I am not at all of that opinion. The excessive use of pruning has done more harm than good. Considered from a physiological point of view, pruning is an unnatural mutilation, which, guided as it often is only by caprice and lack of knowledge, ends in results harmful to the plant which has undergone it. And if I prune Roses according to my method, it is not all on account of any organic necessity; the plant can perfectly well do without it, and, following the nature of its species or variety, will also grow larger and be more beautiful, because it naturally possesses a reserve of growth-power in the parts usually cut off. But as the Rose-tree is destined to live in a restricted space, I am obliged to prune the upper portions of it in order to be able to satisfy the demands of fashion."

These quotations are enough to show that if pruning gives rise to certain inconveniences, it has nevertheless numerous adherents amongst professionals, which is a certain sign that it possesses more advantages than disadvantages, and that the important point is to know how to practise it correctly and with prudence.

Since the far-off days when poets sang of the birth of the Rose, several entirely new families of them have been born which would have astonished the flower-loving bards. Roses are no longer the same shrubs about which the poets sang, and a whole new world of them has arisen in consequence of the somewhat adventurous marriage between the Indian and the Gallica Roses. New introductions, of types unknown to the ancients, and until quite recently to moderns also, have arrived to people our gardens. The yellow race with all its crosses, the giants with their hybrids, the dwarfs with their mixed descent, have all given rise to a new population which has displaced the ancient race, a people mottled, marbled, heterogeneous, easy to work, flourishing and floriferous.

It is in this new race that we are most interested, for it is it which has made pruning so difficult. But before attacking it, pruning-knife in hand, this would seem to be the place to classify it categorically, in order that no one may ignore the fact that the genus *Rosa* is not a single entity, but a collection, of many species, races, and individuals which must not be uniformly clipped like a flock of sheep.

The Roses of ancient time were not, for the most part, Perpetuals; some of them blossomed twice a year fairly regularly in some climates, and very irregularly in others. And it was only at the end of the eighteenth

century that China and Bengal Roses began to be known; it is less than a hundred years since the crosses between the Musk and the Indian roses, the Bengals and the Centifolias and so many others came to claim a place in our gardens. And this place has become so large that the old-fashioned Roses are no longer given any room to speak of. This is not the place to discuss the question as to whether many of the Provins Roses—the Rose of the painters—and many other of the discarded beauties would not be preferable to certain of the so-called Perpetuals which are never perpetual. But let us get to our business: that is to say, pruning and the principles which should guide it.

How to Study the Principles of Pruning.

The gardener's art is one of observation. When I wished to know why it was necessary to prune in one way rather than in another, I went to Dardilly, Charbonnières, Brindas and Chaponost—villages round Lyons—to see how the Gallicas and Dog-Roses behave in their wild state. The Gallicas are the ancestors, more or less related to the Provins Roses; the Caninas are wild Briers; and I confine myself to these two species, which are quite enough for the demonstration I wish to make.

The Gallicas I have found were represented by small bushes with stolons showing just above the ground, only allowing scope for a very modest pruning of the branches, of which the oldest did not look very aged, although of a very decrepit appearance.

The wild Briers, however, were giants of three mètres in height, with very thick strong stems, and with their tops thickly covered with Roses.

At one and the same time, I had under cultivation some of these Roses and some garden Roses, and having pruned them all alike to within 30 centimètres of the ground Provins, Centifolias, Noisettes, Teas, Hybrid Perpetuals, Bengals, Multifloras, Banksias, Damascs, Caninas, Gallicas, &c. (all of them being well established and healthy), I obtained the following results: The Provins Roses, the Centifolias, the Noisettes, some of the Multifloras, the Banksias, some of the Teas, the Damascs, the Caninas and the Gallicas produced magnificent growths, of different forms, but not one single flower. On the other hand, some of the Teas, some of the Multifloras, the Hybrid Perpetuals, and the Bengals flowered admirably.

Thus, with the genus *Rosa*, we find ourselves in the presence of a section of the vegetable kingdom of which the physiology is somewhat complex. It is very important, then, for professional gardeners or amateurs to take account, on broad lines, of how the different species of the genus behave when pruned. An expert, if he wishes to become very well-up in the subject, will even study each variety on its own account; and, thus educated, he will no longer pass for one of those butchers of the time of Herod who massacred the Innocents.

It will be remarked, that in the above experiment all the Roses were uniformly pruned, and that nevertheless part of the Tea Roses and part of the Multifloras flowered and the other part did not. This fact is disquieting to amateurs. One ought also to include the Noisettes, and

this is still more alarming to novices. This is certainly a question of pruning which is connected with the classification of Roses. When one has wished to prove that Polyanthas and Multifloras came from the same source (and correctly so) it was necessary to leave the proof of this to the botanists, and say to gardeners: "No; as far as culture is concerned, Polyanthas and Multifloras do not behave at all in the same way, and that is all we want to know about them." Either these two types had the same mother or two different mothers; and if two different ones, then they were decidedly first cousins. But the fathers were not of the same family; one has produced wide-spreading giants, and the other restricted dwarfs. The Polyanthas, pruned to 40 centimètres, yield bushes covered with flowers; the Multifloras, pruned in the same way, produce bundles of green wood. As far as we are concerned, therefore, this physiological propensity is enough to make us keep the two types separate.

As to the Teas, it would be necessary to trace their origin a little farther back before jumping to the conclusion that, equally in their case, it was unknown pollen-bearing plants which had transformed the rather delicate type of the Indian species into such giants as 'Gloire de Dijon' and its offspring. I firmly believe that the Musk-Rose—the seed-bearing parent of the Noisettes—sent one of its parents to marry one of these delicate Teas, with drooping flowers, and that from this strange union have sprung the widespreading giants which will not thrive if closely pruned.

To learn the art of pruning Roses, it is necessary, first of all, to divide them into two large classes, so as to know: 1st, those which do not flourish at all, or badly, or only by chance when they are pruned short; 2nd, those which flourish equally in whatever way they may be pruned. You will have taken a great step in the right direction when once you have made sure of this classification, for you will obtain blossoms where a novice will only produce long thorny shoots. But this is by no means all one has to learn, for if the pruning of Roses has for its primary object the obtaining of flowers, this is not the only object it should have in view. Pruning has often other ends in view: for example, to train the Roses as hedges, globes, and wreaths, to shape them like tables, to make them weep like the willows of Babylon, to dwarf them, to use them as borderings, &c.; in a word, to train them into any desired shape or form.

These two, then, are like general rules which it is necessary to understand before arming oneself with the pruning-shears; the rest will come by degrees. But do not think that this is all. If you live at Lyons, for instance, do not go to Nice or Cannes to practise your art. When you are in Rose-growing districts, ask advice of those accustomed to the work, who prune differently from yourself and operate at different times of the year.

Dr. Barnier suggests the two following methods of pruning for the South of France.

First method.—If you wish to obtain a great number of flowers (as in the case of growers of winter blossoms for sending abroad), it is necessary to prune at the end of August or beginning of September; or if you wish for very late blossoms, defer pruning until the end of September or beginning of October. In either case, at first only give a partial pruning, removing the small twigs, and the too crowded or tangled

branches which would hinder flowering or prevent the full access of air and light. Then, of the remaining branches, select rather more than half of the shoots of the year's growth; entirely remove the old wood above the point from which the shoots spring, and finally shorten the shoots themselves to 10, 20, or 30 centimètres, according to whether the varieties operated on are naturally small or of large and spreading growth.

Second method.—If, not being a dealer in flowers, you only want fine, beautiful, symmetrically-placed blossoms, it is necessary to proceed more soberly; to prune at the end of February or in March; always cutting out all the twigs and spindly branches, &c.; then choose, according to the strength of the plant, two, three, or four shoots, not more, and cut these all to about the same length, above an eye pointing outwards, so that the extreme shoot, when it grows, will not fill up the middle of the bush. As a matter of course the varieties that are of feeble growth will be pruned to 10 centimètres in height, the strong-growing ones to 20, and the spreading ones to 30 centimètres. In both methods alike it is necessary, as far as possible, to get rid of the old wood, which absorbs much sap, and not to leave a single stump, which is always a cause of decay.

On Rose-trees the flowers spring from twigs of the current year's wood, except in the case of the Banksias and two or three other species which do not belong to our climate. On these the flowers only come on two-year-old wood—that is, on the shoots of the year before; and these flowers do not grow at the base of the branch, but at a certain height and near the top of it. Thus to cut back these branches in the way I have just pointed out would be to never have any flowers on them. For Banksian Roses, then, it is only necessary to cut out the dead wood, cross branches, and those which do not go in the right direction, and above all to preserve the two-year-old shoots entire. You see, then, that there is another very important matter as regards pruning, viz. to know the best time of year to prune, according to the district you live in. M. de Chesnel says:

Formerly the pruning-hook was employed for pruning Rose and sundry other bushes into spheres, pyramids, and other shapes, but now we limit ourselves to the use of a knife or of sécateurs, and do little spherical pruning unless in the case of the Meaux Roses and the Scotch with double white flowers, which, budded on the Brier and pruned in this manner, give fine effects. Roses ought to be pruned with scissors as soon as ever the flowering is over. Besides this first cutting, most varieties should be pruned again with the knife in the month of February, when the sap generally begins to flow. They should also be freed from any dead wood, branches that are spotted with white mildew, and lastly from anything that hinders their growth.

This shows us that, for certain varieties of Roses, the principal pruning should take place in June: that is to say, when they are in full growth, but after the blossoming is over. Monsieur Cagneux writes as follows:

The pruning of Roses is usually done at the end of January; for my own part, I operate on hardy Roses, such as the Hybrid Perpetuals as soon as the last flowers have done. I cut out the old wood and stumps,

then I shorten the branches left to two eyes above the ordinary pruning, which should be from 10 to 15 centimètres in length for the strong-growing varieties, such as 'La Reine,' 'Lion des Combats,' 'Baronne Prévost,' &c. I would remark that one ought to regulate one's pruning according to the state of growth of one's Roses. At this time of year, the sap being still moving, the eyes at the extremity will form themselves into little buds, which by the time that growth has entirely stopped will have become large eyes. In the spring, when growth starts again, these eyes will only grow to the length of 20 to 25 centimètres, and will produce flowers, whereas if the plants had been pruned in January, as is commonly done, they would have made shoots from 40 to 50 centimètres in length; but whilst these shoots would have been growing 20 centimètres longer, the others will have already produced flowers. The branches should be cut directly they have flowered, and the plant left pruned as desired.

For Bourbons the pruning is different. The dry wood and any branches that are in the way are cut out as soon as the last flowers are over, but they are not pruned until growth recommences, so as to see which eyes are the strongest. If Bourbons are pruned too soon they will not produce flowers, or at any rate they will not come till late in the season. Teas should be treated the same way as Bourbons. There are some varieties amongst the Bourbons and also amongst the Noisettes, such as 'La Biche,' 'Solfatare,' &c., the branches of which should only be tipped; because these varieties grow so tremendously vigorously that they would have no blossoms at all if pruned short. It is a good plan to bend their branches over by tying them down to the stem.

I have already quoted several authors some of whom have interested themselves in the question of Rose-pruning, and some of them able men in Rose cultivation; amongst these latter some pass lightly over the pruning, for them a subject of no interest. One such work, of 200 pages 8vo., only devotes one page to the subject! What can one say, worth saying, in one page? It is not for me to boast, but I have bought many books on the Rose—books large and books small, 4to., 8vo., 16mo., and 32mo., pamphlets, leaflets, &c.—yet in all these treatises, great and small, it is chiefly the poetry which runs in full flow. Loiseleur, for instance, who was a good botanist, in a work on the Rose, devotes 127 pages to the history of this flower, 87 pages to poetry, but almost forgets to mention the pruning. J. Bel, in his chapter on Pruning and Training Roses, assigns to the subject of pruning seventeen lines!

E. Forney and B. Verlot are, as far as I know, the only authors writing on Roses, who give to pruning the importance which it deserves. The former may be consulted with advantage by those who really wish to understand the subject. He says:—

The pruning of the Rose consists:

1. In removing those parts which are dying back or awkwardly placed, so as to assist the perfect development of the useful portions which ought to be preserved.

2. To thin out the superfluous growth, as the Rose produces many more shoots every year than its sap can bring to perfection.

3. To shorten back the shoots, so as to concentrate the sap in certain of the eyes at their bases, so that these eyes may be able to produce flower-bearing branches.

4. To replace every year the branches that have flowered by young branches to flower in their turn. We know that the blossom is produced on the current year's shoot; it is necessary therefore to assist the development of these shoots by the removal of those that have flowered.

5. To evenly distribute the sap by giving to the branches a suitable direction and even height, so that they may all be equally strong and floriferous, and that it may be possible to enjoy their blossoms from a single point of view.

6. To increase the number of the branches; for if one prunes a branch, one is sure to obtain, below the part pruned away, two or three shoots, which will form as many branches, of the height and in the positions required.

Monsieur E. Forney also lays down the following axioms, which every Rose-pruner ought to take to heart:—

"1. We give vigour to a branch by pruning it hard, if all the other branches are cut equally short. It is evident that the concentration of the sap will cause all the branches to develop with equal vigour.

"2. We weaken a branch by pruning it hard if the other branches are left long. The sap flows by preference through the long branches, and leaves the short one in a state of marked inferiority.

"3. We give vigour to a branch by leaving it long if all the other branches are pruned short. The long branch dominates the others; and being higher and furnished with a larger number of eyes, it attracts to itself all the sap.

"4. We weaken a branch by leaving it long, if all the other branches are pruned equally long. The branches are too much extended for the roots to be able to furnish them with a sufficient quantity of sap; they mutually weaken each other and grow with less vigour."

It would take a long time to adequately discuss Monsieur Forney's fourth axiom. If pruning weakens all the growths concerned, one asks oneself how one can weaken a branch by pruning it long, if all the others are left long also. The two propositions are altogether contradictory.

Monsieur Eugène Forney's book, as also that of Verlot, is unfortunately in some respects obsolete. Since their publication a revolution has taken place in Rose-growing. The Rose on its own roots has been replaced, for the most part by plants budded at the ground level; new varieties, as well as new species, have taken the places of the old ones; the South has "moved on" and the North has seen its growth of out-door Roses diminished, and its cultivation under glass considerably lessened, and this revolution from North to South, which Forney could not have foreseen in 1864, has introduced certain modifications into the manner of pruning; but, in spite of this, the precepts given by this able professor, based on the physiology of the plant, may for the most part be always taken as a theoretical basis in pruning.

Styles in which Rose-trees may be Pruned.

Those who have made a study of pruning fruit-trees know that it consists of two principal parts:

1st. To form a tree into a pyramid, palm-shaped, standard, cordon, espalier, &c.

2nd. To prune and pinch back the fruiting branch.

The Rose-tree may be submitted to precisely the same operations. Roses in fact are trained as espaliers, and generally very badly so trained, as pillars, as arches, as standards with trimmed heads, as umbrellas, as cordons, as dwarf bushes, as cups, &c.; and the framework of the tree having been once established, it is only necessary to keep it to that shape, and to take pains to make it produce Roses.

Dwarf Roses.

Dwarf Roses are the ones most usually found in gardens, and it is not necessary to be very expert to train them properly. Nevertheless it is as well to know that many Roses often refuse to blossom if grown in this way. Such are the Spreading Teas, Spreading Noisettes, Spreading Multifloras, Rosa Bracteata, all the non-perpetual Roses, the Centifloras Moss, Provins, Damasc, Pimpernel, Banksian, Rugosa, Microphylla, &c. The Briers, the Capucine Roses, *Rosa Lutea*, and numerous others are also in the same case. It would appear from reading this list that there can be very few Roses left that can be cultivated as Dwarfs. And indeed there would not be many were it not for the innumerable varieties of Hybrid Perpetuals Dwarf Teas, Hybrid Teas, Bengals, Bourbons, and others usually so grown..

There is no particular rule to be followed for the formation of Dwarf Roses; you cut them hard back, and all is said, or very nearly so.

Roses as Semi-Dwarf Bushes.

This is evidently the form above all others in which to grow the Rose. It has the advantage of creating strong plants with many and fine blossoms on them. It does not encourage the growth of suckers, and ensures a long life to the plant. It permits, also, of the cultivation of non-perpetual Roses of medium growth, such as the Centifolias, Mosses, Provins, and other types of medium height.

Some of the spreading Roses of the Tea and Noisette sections can also be trained in this form, particularly if you can furnish them with a basis of old wood. Unfortunately, except in the South of France, these woody stems are killed by the cold.

Those who would nevertheless brave the fashion, and possess sundry remarkable objects, ought to take particular pains over the planting of their Roses. They ought to prepare for it by digging up the soil and adding fresh loam. It takes four or five years to form a good Rose-tree of this class. The pruned shoots are left a little longer every year; some people draw away the branches from the middle towards the outside of the bush, so as to make use of those which become crowded in the middle of the bush, and which are always removed in Dwarf or Semi-Dwarf Roses.

Personally I have had some very remarkable Roses grown in this manner, but all varieties do not lend themselves equally well to it.

Roses as Cordons.*

Anybody who understands pruning the Vine after Guyot's method knows how to train Roses as cordons. The method, which is only practicable with wide-spreading or very vigorous varieties, consists in obtaining, during the season, one or two very strong-growing branches. In spring, and in our climate also in autumn, in order to protect them from the cold, these branches are bent horizontally on iron wires, 0·50 centimètre from the ground; the end is pruned off and the operation is finished. The secret of success is to know to what length to cut the branches, so that all the eyes will produce flowers, and will allow of the replacing of the horizontal branches by two new ones, which one has taken care to keep in reserve at the spot there the branch is bent. One can assist the development of such replacing branches by disbudding any eyes which show a tendency to develop themselves. In the South of France, or in greenhouses, horizontal cordons can be established, pruned very much like Vines, which will last several years without being renewed.

Roses on Walls.

It is mostly in the South of France that this method of training is employed, because the varieties suited for it are often killed to the ground by the frost in the North; and then they do not flower, or very little, on the new wood they throw up. In the North one must choose as sheltered positions as possible if one wishes to train Roses up walls. The Roses are planted a mètre apart, or still further if the soil is very fertile. Then they are trained like a Vine in the fashion of Tomery. The first year it is pruned very little; it is left to establish itself. The second year it is cut down to the ground; if it pushes vigorously the shoots are allowed to grow as they will, being all nailed to the wall. If, however, any of the shoots spread beyond the space they are required to fill the next year, they are pinched back when quite green so as to check their too vigorous growth. In the following spring each shoot is trained on an iron † wire or trellis fixed to the wall which the Roses are intended to cover. One of the Roses covers the middle part of the wall and another the top. If the wall or front of the house is not very large, one plant may often be sufficient to cover it. We have seen Banksian Roses covering surfaces 80 mètres square. Where a single tree is planted against a wall, there is need to watch the development of its branches very carefully. By pinching some of them in the green stage, at different heights, it is easy to cover the base as well as the summit of the wall.

Roses for Pillars, Pergolas, Arbours, &c.

All wide-spreading or long-branched varieties can be trained in these different ways, and the directions given for Roses on walls can be

* Monsieur Morel probably means what we in England call 'pegged-down Roses.'

† It is dangerous to attach Rose or Fruit trees to *iron* in Great Britain, as the extreme cold will often kill the shoots at the points where they touch the iron.

employed. For covering bowers and arbours, several varieties should be chosen, differing in vigour of growth, so as to obviate the tendency of the very free ones to be bare at the base. Plant in succession a wide-spreading one, a medium spreading one, and one which makes very long upright wood, and in this manner the whole of the bower or arbour will be covered from top to bottom.

The following is a list of classes suitable for covering large surfaces: Non-perpetual Multifloras (height 3 to 4 mètres), Bramble-leafed Roses (3 to 4 mètres), Boursault (2 to 4 mètres), Banksians (3 to 10 mètres), Anemone-flowered (2 to 4 mètres), Evergreen Roses (3 to 5 mètres), Ayrshire (5 to 8 mètres), Bracteata Roses (3 to 6 mètres), Climbing Teas (3 to 5 mètres), Noisettes (3 to 8 mètres).

In each of these sections there are some more or less striking varieties, and every year new ones appear, especially amongst the perpetuals. Several of the older non-perpetual varieties have been abandoned for others with a more prolonged flowering season. There are also the climbing Hybrid Perpetuals—those the French call "à long bois"—which can be used alternately with the wide-spreading ones.

Standards.

There are medium standards, standards, and tall standards; the last being suitable for forming Weeping Roses, Roses with large round heads, &c. But whatever may be the height of the stock, the principles as to forming the head are the same, except in the case of the Weeping Roses.

Very often the stocks are of medium rather than strong growth; and it will be easily understood that one must not dream of forming large heads on such subjects. The stocks are collected from hedges or woods, and are trimmed in such a way that almost all the large roots are destroyed. The budder finds before him a walking-stick, often weakly and thin, furnished with two branches, and these he must bud as best he can. On stocks of this kind he must prune most of the Rose branches hard, and think himself lucky if he obtain five or six good flowers the first year or two after it is planted. If by means of manures, road-scrapings, syringing, and watering, the standards grow stronger, then the pruning may be left longer, and the middle hollowed out in such a way as to form a larger head, measuring 60 centimètres to 1 mètre in diameter. Roses of this size are much more robust because the roots grow in proportion, and suckers are less likely to be formed.

Weeping Roses.

Roses with weeping branches are best obtained from varieties with long, pliant, wide-spreading shoots, such as the Noisettes and Teas possess. With 'Aimée Vibert' one can produce veritable masterpieces. 'William Allen Richardson' (intermediate between Teas and Noisettes), 'Ophirie,' 'Gloire de Dijon,' 'Reine Marie Henriette,' * &c., do equally well trained in this manner.

To form these beautiful Rose-trees, it is necessary to procure some

* Add Wichuraiana varieties, Crimson Rambler and its relatives, Blasii No. 2.

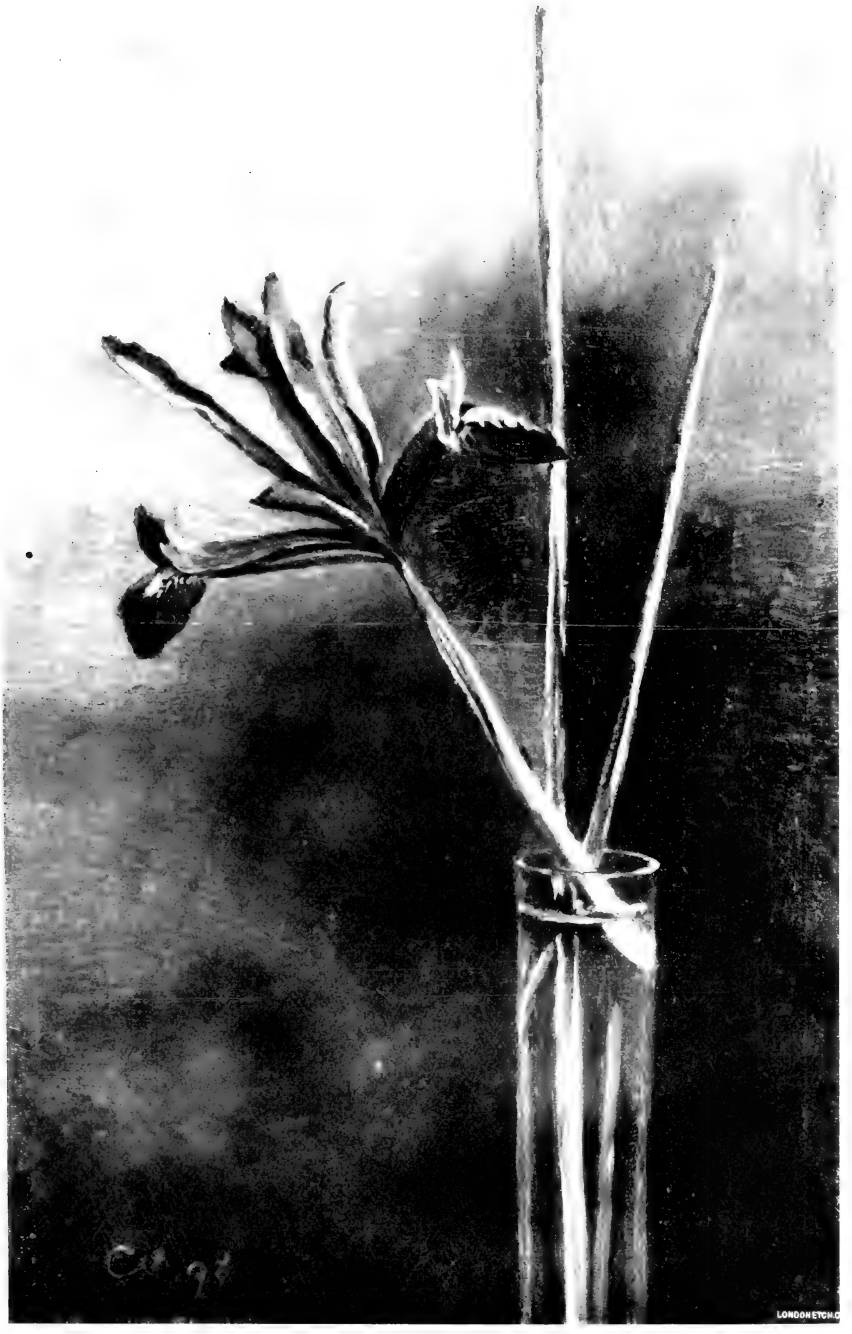


Fig. 115.—Iris reticulata.
Fl. deep blue-purple; F. with orange crest. Red. $2\frac{1}{2} \times 3\frac{1}{2}$.

Fig. 116.—Iris Histrio.

S. and St. bright light blue: F. creamy-white, with large deep blue spots and golden crest. Nat. size.

Fig. 117.—Iris Histrio.

S. and St. bright light blue; F. creamy-white, with large deep blue spots and golden crest. Red. $2 \times 2\frac{3}{4}$.

Fig. 118.—Iris histrioides.
Fl. rich bright blue; F. with darker spots and gold crest. Red. $2\frac{1}{4} \times 3\frac{3}{4}$.

Fig. 119.—Iris Vartani.

Fl. pale lavender above, green beneath; F. with white lines and gold crest. Red. 2 × 3¼.

Fig. 120.—Iris Bakeriana.
S. and St. blue; F. white, with yellow line, black spots and tip. Red. $1\frac{1}{2} \times 2\frac{3}{4}$.

Fig. 121.—Iris Krelagei.
Fl. reddish-purple ; gold crest on F. Red. $2\frac{1}{2} \times 2\frac{3}{4}$.

Fig. 122.—Iris Boissieri.

S. purple with dark veins; St. pinkish-lilac; F. blue-purple, veined, broad golden crest. Red. 3 × 3½.

Brier stocks measuring at least 2 mètres in height, and to take great care in planting them. They should be budded at once with a dormant eye in August. In the spring, if they have made three leaves, the shoots should be pinched in the green stage when they have reached a length of 15 centimètres; they may then be left to grow as they please. In the following spring, the pruning of the branches is proceeded with in such a way as to keep about a dozen of them, which are left to grow as they choose, unless some of them grow too much to the detriment of the others, in which case the equality of the branches should be re-established in the ordinary way.* In the third year all the branches may be bent horizontally, by means of osiers tied on to the stem, but a hoop, held in place by three stakes, makes it easier to obtain the desired results, as you can better fix the branches at equal distances from one another.

Time of Year for Pruning.

The time for pruning varies according to:

1. The species and variety;
2. The end one has in view;
3. The climate;

Non-perpetuals, like the Provins, Centifolia, and Damasc Roses, are pruned first after they have flowered in June or July, and again in February or March before they have begun to grow.

Perpetuals like the Bengals, Teas, Noisettes, Bourbons, Hybrid Perpetuals, Polyanthas, Hybrid Teas and Noisettes, &c., are generally pruned from August to October in the South of France, and in February to March in countries where the cold is severe. In the South, Hybrid Perpetuals are pruned in January.

In the climates of Paris, Lyons, and Central France, such Roses as 'Souvenir de la Malmaison,' 'Mrs. Bosanquet,' 'Safrano,' 'Cramoisi supérieur,' and others pruned at the end of August and covered with frames in October, blossom in November and December. This was the South of France method of cultivation, only using frames instead of the sun.

The time of pruning varies according to the purpose we have in view.

The time of pruning also varies with the climate, because in countries where the cold is severe the wounds caused by cutting the branches may be a source of danger if rather severe frosts occur after pruning. If this trouble does not exist, one can prune as soon as growth has ceased.

If we wish to accelerate or retard the flowering of a Rose, the time when the pruning is done has considerable influence. Two Roses pruned at different times, everything else being equal, will not flower at the same time; the Rose that was the first pruned will be the first to flower.

Means of Advancing or Retarding the Flowering Season.

It is possible to advance or retard the flowering of Roses by means of pruning or pinching at certain times of year. Let us take two plants situated in the same border and with the same exposure.

* To bend down a branch is to check its growth; to turn it upright is to strengthen it; to remove some of its leaves is to lessen its vigour.

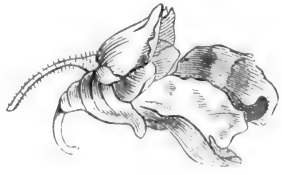
If, in the spring, you prune one of them and not the other, the result will be that the unpruned one will blossom twelve or fifteen days before the other, and it will produce more Roses, but they will not be so fine.

If, when pruning, you have left on one of them any feeble branches or twigs, and have removed them from the other, it will be on the stock on which you have left them that the first flowers will show; these flowers will be produced on the twigs, and will be from twelve to fifteen days ahead of those which will develop on the pruned branches.

If both are pruned in the same manner, but one on October 15 and the other in February, the one that was pruned in autumn will flower the first.

By bending the branches of one of them horizontally, about September 15, and leaving the branches of the other in their normal position, and if in the spring they are both pruned alike, you will get earlier blossoms from the one whose branches were bent down.

If one is pruned in February before growth begins, you will gain a little over the other pruned later, and by cutting back very low in April unpruned Roses which already show their buds the flowering is very much retarded. The pinching back of all the shoots which develop after a Rose has been pruned also much retards its flowering. It is necessary that this pinching be done before the flower-buds appear, when the shoots have only three or four leaves. I have often astonished Rose-growers who have examined the system of pruning to which I have subjected certain Roses in my collection. Not long ago I was asked from what country I borrowed my system. "I have not borrowed it," I said, "I keep it." Being very fond of Roses, I arrange to have them for as long a time as possible, and attain this result by a system of pruning which astonishes my brother Rose-growers. And this is the way I manage: If I am dealing with a number of Rose-trees together, I prune all the branches of those on the outside almost level with the ground, I lengthen the pruning of the next rank by 5 centimètres, the third row by 10 centimètres, the fourth by 30 centimètres, and so on in proportion. In the middle I leave on each plant a branch of full length, without pruning it at all, and bend it down to the height of the longest pruned ones. Do you know what I obtain by this means? Early Roses on the bent-down branches which were not pruned, fairly early ones on those pruned long, and very late ones on the plants cut quite down to the ground. I sometimes manage to get all this on the same bush by pruning three-quarters of the branches to the ground level and the rest of them to 20 centimètres, except one which I do not prune at all. It is the unpruned one that gives the first blossoms, and I cut off this branch when its flowers are over.



IRISES FOR THE ROCK-GARDEN AND THE WATERSIDE.

By Eleonora Armitage.

[A large number of beautiful oil and water-colour paintings of Irises by Miss Cecilia Armitage were exhibited. Some of these are reproduced here, but they only give a partial idea of the beauty of the originals. The following abbreviations are used in the description at the foot of most of the Illustrations, which are all strictly copyright :—F = falls ; S = standards ; St. = styles ; fl. = flower ; nat. size = natural size ; red. = reduced. Actual size of flowers is given in inches :—*e.g.* 4 × 3 = 4 inches long, 3 inches broad.—Ed.]

I must ask your indulgence at the outset, if, during the notes which follow, an Iris enthusiast may seem to speak in too high praise of the members of this genus. It may readily be granted that they are not all equally beautiful, but most of them have grace of form and pure rich colouring, while many are of transcendent loveliness.

The species and varieties of Iris are indeed numerous, and they are greatly diversified in habit, ranging from gems of three inches in height to stately forms reaching five and six feet. They are adapted to many differing habitats—the open border, the rock-garden, the warm shelter of a wall, and the water-garden. They have an exceedingly long range of flowering, extending as it does from December to August. They show much diversity in the form of the flowers, and many species are fragrant. They exhibit a wonderful variety of colouring, many exquisite combinations of tints and much varied detail in the surface markings. All these qualities combine to make this genus of unique attraction to the amateur whose gardening is restricted to the cultivation of hardy plants. Irises form our earliest winter bulb-garden, Irises abound in our spring garden, Irises riot in our May garden, Irises flower with the Roses in our June garden, Irises people our July water-garden.

When one looks around on gardens otherwise well furnished, where a hundred species of Irises might easily be grown, and one sees the genus represented by two or three, or possibly half a dozen, one asks why this is, and tries to find the answer. Putting aside ignorance of species, which can readily be turned into knowledge by the diligent study of the best plant lists, the answer seems to be contained in the fact that Irises, though hardy, agree with most other plants in requiring careful cultivation.

Now the many species of Iris require many different forms of care, and everyone has not the leisure or the inclination to discover these by the slow yet sure process of personal experience. It is therefore with the hope of helping some would-be Iris-grower that these notes have been put together.

As the genus is far too large to be treated of at one time, two very distinct sections only will now be discussed, namely Bulbous Irises for the Rock-Garden, and Some Rhizomatous Species for the Water-Garden.

Bulbous Irises.

Climate.—The Bulbous Irises, in their Eastern homes, are never disappointed of their sun-ripening. During the rest-season the sun shines continuously out of a cloudless sky, the herbage turns brown and withers away, while the soil becomes thoroughly dried and baked for some distance below the surface. Here the bulbs lie safe, warm, and dry, until the coming of the call to renewed life which none can resist. The already formed shoot, till now dormant, springs forth from the bulb, and with unerring aim grows upwards until it pierces the soil, now bathed and cooled by the spring rains. To what a different scene do the bulbs emerge in our Northern climate!

During spring and early summer the Iris leaves are growing and working, gathering food material in conjunction with the roots, to furnish next season's flowers, and for the making of fresh bulbs. June comes and the leaves wither off, and the bulbs should rest secure from then till late autumn. The dry, hot summers and autumns that we enjoyed lately suited the Bulbous Irises to perfection; they throve and increased amazingly. But what of the summer and autumn of 1902? The dull coldness, the many rainy days, the wearisome absence of sunshine, the cloud-veil which would not lift? It is not surprising that these Irises, lovers of dry warmth as they are, should have suffered considerably, and that the spring of 1903 should find some of our choicest species represented only by the deserted labels, the sad memorials of former beauty! Thus died *Iris Bakeriana*, *I. Krelagei*, *I. Vartani*, and *I. Danfordiæ*. Some of these species made a gallant effort to keep the race going. In the case of the two last-named species quite a number of tiny offsets were produced from the old bulbs, each of them sending up a very small slender leaf. These were carefully removed from the decayed bulb and replanted, and may be expected to reach flowering age three or four years hence.

Position and Culture.—The position on the rock-garden in which the Bulbous Irises are grown is of the first importance. They must have fullest exposure to sun and air, with a south-east aspect if possible. They should be placed on the highest level, so that the rain and melting snow may drain away from them, for there should be no risk of moisture lodging about or dripping from higher stones. This will be the most advantageous position for them during their flowering time, namely in winter and early spring, and will also prove a dry situation for the ripening process during summer and autumn. After the foliage has attained its fullest growth, which will not be until long after flowering, it should be tied up in a neat bundle to a suitable stick, so as not to injure the neighbouring plants; for the leaves, for instance, of *Iris Histrio* grow twenty-four inches long, and those of *I. reticulata* thirty-six inches. As soon as the foliage is withered enough to be safely removed, not until the beginning of June, then the soil beneath which the bulbs rest may be covered with a sheet of glass, slightly raised on stones or wires, to keep off rain and to encourage the needful work of drying. In late autumn the glass should be removed, the surface of the soil should be loosened and

finely divided, and soon the tiny green spears will pierce through. Then the slug-guards of perforated zinc should immediately be placed around the groups of bulbs. At this season, and during the winter, there are few other young juicy shoots in existence, and the slugs and small snails which are not hibernating find out the little Iris leaves at once. They will quickly eat them down, and, later on, will disfigure if not quite destroy the flowers. All other herbage in which slugs might harbour should be kept away from the Iris groups, which are all the better for a free space of air and light around them. Many are the disappointments caused by the attacks of slugs; for instance, I have known the whole shoot and flower of *Iris taurica* to be eaten down to the base of the ovary before the plant had shown above ground at all. It was only on digging down to see why it did not come up that the damage was revealed, and nothing but the maimed remnants of leaves grew up above the surface. The eagerness of slugs to get at the Irises may be realised from the fact that small ones are often captured trying to get through the meshes of the zinc, some of them sticking half-way. The Bulbous Irises are quite unaffected by frost, but in exposed situations a little dry bracken may be placed around, not on, them; and if there should be heavy rain or snow while they are flowering, a bell-glass, or sheet of glass supported above them, will preserve the flowers.

Bulbous Irises thrive in a light sandy loam mixed with leaf-mould, occasionally enriched with a slight dressing of some fertiliser where the nature of the ground prevents the application of well-rotted manure. They should never be moved until division is made necessary by great increase in the bulbs, and the latter should be planted from four to six inches deep.

Description of Species.

Some of the hardiest species will now be described.

Iris reticulata is known to all gardening amateurs; it is exceedingly free-flowering, and increases rapidly. The rich purple colour of the flower, the tones of which are accentuated by the conspicuous orange crest on the falls, combined with its fragrance and many days' duration, make it the most desirable species to have in every garden. It may not be generally known that these Irises travel well by post. They should always be gathered when in bud, and immediately wrapped tightly in tissue paper, or they will open prematurely when brought into the warmth of the house out of the frosty air. A little damp moss should be placed at the ends of the stalks, and then leaves and flowers, after a few hours in water, should be tightly packed in a strong box. The next morning, when unpacked, they at once open out in beauty, and with care will last from a week to ten days in water. These delightful flowers continually prove to be a source of simple yet satisfying pleasure to dwellers in cities and to invalids in the sickroom, who are debarred from the sight of the glowing groups in the open air (fig. 115).

Iris Histrio is for sheer beauty the queen of this group. It is a bright lovely blue, with creamy falls covered with dark blue spots, the golden crest marking the median line. It is hardy and prolific (figs. 116, 117)).

Iris histrioides, which is nearly allied to the last, rises out of the frosty

ground on a very short stalk and displays a large blue flower of amazing brilliancy. The falls are spotted with deeper blue and have the gold crest, but lack the creamy tint which adorns those of *Iris Histrio* (fig. 116).

Iris Vartani flowers very early, and is a most refined-looking flower, almost ethereal. Its colouring is a delicate lavender mixed with green hues, and the form is graceful and slender (fig. 119).

Iris Bakeriana is a striking-looking flower; not large, but the blue-and-white colouring is brilliant, and there is a most distinctive patch of velvety black at the tips of the falls (fig. 120).

Iris Krelagei is a purplish-red form of *Iris reticulata*, but is less beautiful than the type (fig. 121).

A distinct and beautiful species is *Iris Boissieri* (fig. 122), which is to be recommended because it flowers in June, when the others are over. It does not appear above ground until February, and it grows a foot high. The standards have dark veins on a purple ground, the styles are pinkish-lilac, the broad drooping falls are blue, purple-veined, with a large conspicuous central stripe of golden yellow, which has a hairy surface.

Iris Danfordiæ is a charming little yellow flower, and as it blooms in February it is most useful as a colour-contrast when grown with *Iris Histrio*, *Iris histrioides*, and *Iris Bakeriana*. The golden falls have an orange crest, and there are small brown spots on the claws; the styles are also golden, with a double line of green; the standards are like tiny threads, this plant being a connecting link between the Xiphion and the Juno Irises which are now to be considered (fig. 123).

Very few of the Juno group can be called really hardy, but there are several lovely species among them, and *Iris caucasica* (fig. 124) is one of the most elegant. The narrow recurved foliage is white-edged; the flower is a brilliant light golden-green, of a satiny translucent texture, softly lustrous. There is a raised fleshy yellow crest on the broad falls; the falls have the shape characteristic of this group, namely a projecting flap on each side, which curves up and clasps the styles; the flowers are borne in the axils of the upper leaves. This plant flowers at the end of March and beginning of April. There are other species, as *Iris alata*, a fine blue flower, very early; *Iris sindjarensis* (fig. 125), with a succession of curious blue-and-white flowers growing out of leek-like foliage; and *Iris persica* (figs. 126, 127), with its varieties, the type being very lovely with its duck's-egg green, its gold stripe and black velvet tip. They will flower the first year from imported bulbs, and possibly the second year. They will indeed go on living year after year in our climate, throwing up leaves each season, but scarcely ever flowering, showing that they are not acclimatised. Therefore they cannot be recommended as satisfactory for general culture unless fresh bulbs are obtained every year, but the Iris-lover's ambition is very different from that.

There are a few very small rhizomatous Irises which flower on the rock-garden in late spring. *Iris cristata* and *Iris lacustris* are bright blue; *Iris verna* dark blue; and *Iris arenaria* and *Iris flavissima* (fig. 128) are yellow. They like an open level situation, with some degree of moisture.

Fig. 123.—Iris Danfordiæ.
S. and St. yellow; F. golden with brown spots and orange crest.
Red. 2 × $2\frac{3}{4}$.

Fig. 124.—Iris caucasica.
Fl. golden-green yellow crest on F. Red. 2 × $2\frac{3}{4}$.

Fig. 125.—Iris sindjarensis.

S. and St. blue; F. greenish-blue and white, with gold crest. Red. $2 \times 2\frac{1}{2}$

Fig. 126.—Iris persica.

Fl. light greenish-blue; F. with gold crest black-spotted and purple tip.
Red. $2\frac{1}{2} \times 3$.

Fig. 127.—Iris persica, var. purpurea.
Fl. light purple and yellow; F. with deep purple tip. Red. $1\frac{3}{4} \times 2\frac{1}{2}$.

FIG. 128.—IRIS FLAVISSIMA.

Fl. yellow; F. with orange crest and brown pencillings. Red. $1\frac{3}{4} \times 2\frac{1}{4}$.

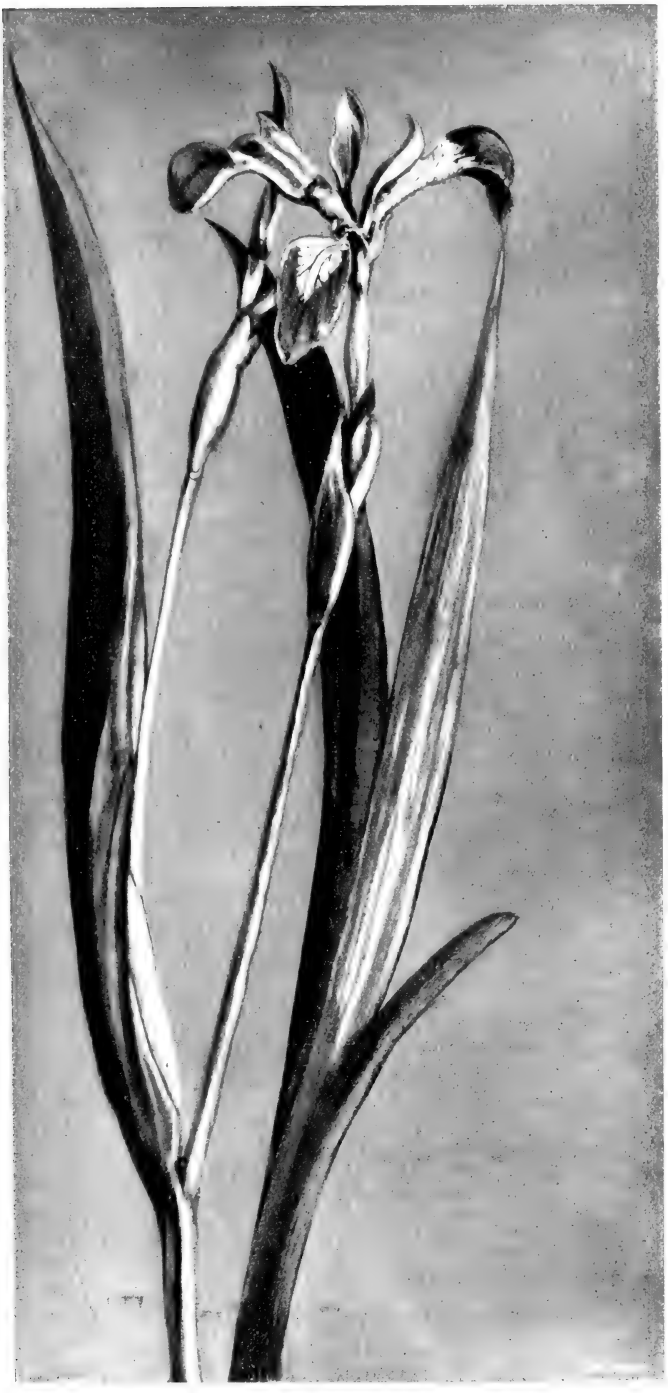


Fig. 129.—Iris virginica.
S. and St. lilac; F. purple, with purple veins on white ground.
Red. 2 × 3½.

Fig. 130.—(1) Iris longipetala.
S. violet; St. pale violet; F. white, pencilled lilac, claw yellow. Red. $3\frac{1}{2} \times 4$.

(2) Iris graminea.
S. and St. reddish-purple; F. white, streaked blue and purple. Red. $1\frac{1}{2} \times 2\frac{1}{2}$.

Waterside Irises.

Water-loving Irises thrive well by the side of a small stream where the water supply is at a fairly constant level; but they do best by the edge of a pond or lake when the water can be kept at the same height by automatic means. It is far more difficult to grow them by a pond which has no outlet and is merely fed by surface drainage. In this case, during winter and spring the Irises are probably submerged a foot or more, while in summer and autumn the pond shrinks and they are left high and dry. If waterside Irises like to have their feet cool and moist, an essential point in their welfare is to have their heads in full sunshine. Many will do well in a fairly damp, sunny border, and will flower abundantly. But if the stream or pond be overshadowed by large trees, they will only be a source of disappointment from the few flowers they will produce. They are quite hardy and grow rapidly and vigorously if they are given plenty of good rich soil and well-rotted manure, but we want more than an abundant leafage. If there are waterfowl on the pond or lake, it will be necessary to enclose the water-garden with wire-netting, as both wild duck and moorfowl are most destructive to root and shoot.

The following are suitable species for a damp situation, and do not object to being submerged during some part of the year. All the forms of *Iris sibirica*, blue and white, thrive in the water-garden, and with their narrow green foliage and slender branching stems, bearing a succession of small elegant flowers, are quite pretty, the best form being *Iris orientalis*, with its handsome dark blue flowers. These flower with *Primula japonica* and together form exceedingly brilliant and effective groups. The North American swamp-loving species are also ornamental. *Iris virginica* (fig. 129) has deep lilac flowers, with lilac-blue pencillings on a white ground, and has a flat-topped appearance from the small size of the standards. *Iris longipetala* (fig. 130) is attractive from its loose wavy outline and delicate colouring and marking in pale lilac and white, the variety *superba* being particularly harmonious in silvery lilac-grey and white, with a narrow yellow stripe. Other graceful species in shades of blue are *Iris missouriensis*, *Iris Tolmieana*, and *Iris tridentata*. *Iris spuria* is rather a tall species with narrow foliage and violet-blue flowers, with an effective broad yellow blotch on the falls. A smaller species which is not intolerant of a moist habitat is *Iris graminea* (fig. 130), with bright grassy-green leaves and small flowers of a vivid combination of crimson and blue, which are succeeded by a very deeply-ribbed capsule. The tall late-flowering Flags follow in succession after these. *Iris ochroleuca* is very handsome, with yellow and white flowers, several being open at the same time above each other on the stem. Other yellow ones are *Iris aurea* and *Iris Monnieri*, while the common yellow Flag *Iris Pseudacorus* is at its best in the form with variegated foliage. The grandest of all is the fine Japanese Iris, in its cultivated forms, generally called *Iris Kaempferi*. It has both single and double flowers and a wide range of colouring. The huge flat-topped flowers, in wonderful shades and blendings of grey, mauve, pink, blue and white, with gold introduced here and there, well reward careful cultivation.

Some Biological Notes.

It adds considerably to the interest of cultivating any particular group of plants to take note of any morphological or physiological variations or peculiarities that may be displayed therein.

Irises furnish some points that may be worthy of note.

The Variation in Colour of the Pollen.—Taking the bulbous species first, *Iris Histrio* and *I. histrioides*, *Iris Danfordiæ*, and *I. xiphioides* have white pollen; *Iris reticulata*, *I. Krelagei*, *I. Boissieri* (fig. 122), and *I. filifolia* have yellow pollen, while that of *I. Bakeriana* and *I. Xiphium* is golden. In the 'Juno' group we find that *Iris caucasica* and *Iris sindjarensis* have white pollen. In the 'Regelia' group that of *Iris Korolkowi* (fig. 131) is green, and in *I. Leichtlini* it is white. In the 'Oncocyclus' group *Iris susiana* (fig. 133) has white pollen. It is the same in *Iris stylosa* (fig. 134), but it is yellow in *Iris tuberosa* (fig. 135). In *Iris arenaria* (fig. 136) it is slaty-blue, and in *Iris verna* white. In the 'Pumila' group and in *Iris Statellæ* (fig. 137) it is white, except in *Iris nudicaulis*, when it is green, while it is blue in *Iris lenacensis*. In the various species forming the 'Germanica' group it is white, except that it is pale yellow in *Iris florentina* and cream-coloured in *Iris variegata*. The tall Flags, as *Iris ochroleuca* and *Iris Pseudacorus*, have yellow pollen, but in the smaller *I. graminea* it is orange. In the water-loving Flags, as *Iris virginica*, it is white, and also in the 'Sibirica' group, but with a greenish tinge in *I. orientalis*, and in *I. longipetala superba* it is yellow. The colour of the pollen therefore appears to be somewhat arbitrary, and valueless as a morphological character for separating the various groups. White and yellow are, as might be expected, the commonest colours.

Fragrance.—Another point for observation is the presence or absence of fragrance in the flowers, and the character and degree of the same. There are not many Irises that smell sweetly, and they may be most easily grouped under the heading of the scents, for there is little variety. *Iris pallida* and *dalmatica* are very strongly scented with a rich nutty fragrance which may be taken as the typical Iris perfume. The only other scented species in the 'Germanica' group is *Iris sambucina*, with its distinct Elder-flower odour. Lily of the Valley is the scent recalled by *Iris italica* and hybrids of *Iris pumila* and *Iris olbiensis* (fig. 137); this scent is also slightly present in *I. sibirica*, and so strongly in *Iris Leichtlini* (fig. 132) that one blossom will scent a room. Violet scent belongs to *Iris reticulata* and *I. Bakeriana*, and is just perceptible in *Iris Krelagei*; it is also present in *Iris verna*. *Iris Vartani* is vanilla-scented.

Attar of rose is strongly developed in *Iris tuberosa* and *I. stylosa*, and is also present in a lesser degree in *Iris Histrio* and *Iris Statellæ*. A long list of scentless species might be added, including some of the Bulbous group, as *Iris histrioides*, *I. Boissieri*, &c., the 'Juno' and 'Oncocyclus' groups, the Flags, and most of the 'Apogon' group.

In some of the Irises the scent globules appear to be situated in the standards, giving them a glistening and pellucid appearance; in others the scented nectar collects around the base of the stigmas.

Fig. 131.—Iris Korolkowi.
Fl. white, veined claret; St. brownish-pink; F. with deep brown spot. Red. 4 × 24.

Fig. 132.—Iris Leichtlini.

S. bluish-lilac, shading to brown; F. purple, shading to brown, with bearded crest St. brown and purple. Red. $5 \times 3\frac{1}{2}$.

Fig. 133.—Iris susiana.
Fl. grey, with claret pencilling; St. claret; F. dark claret blotch. Red. 5 × 5.

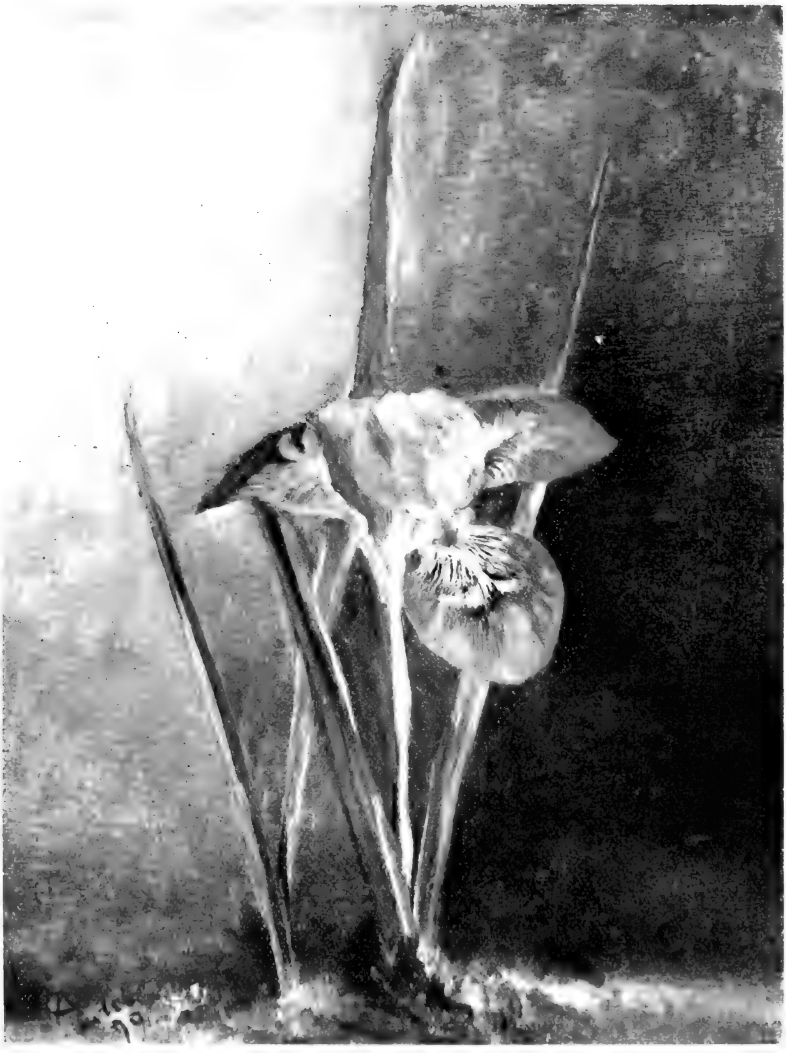


Fig. 134. - Iris stylosa (syn. unguicularis).
Fl. bright mauve; F. marked in centre with yellow and mauve on white ground.
Red. 4 × 5.

Fig. 135. –Iris tuberosa (with Anemone fulgens).
S. and St. olive-green ; F. green with black tips. Red. $2 \times 2\frac{1}{2}$.

Fig. 136. — Iris arenaria.
Fl. clear light yellow. Nat. size.

Fig. 137.--(1) Iris olbiensis.
Fl. purple, yellow beard on F. Red. $3\frac{1}{2} \times 3\frac{1}{4}$.

(2) Iris Statellæ.
Fl. ivory blade, olive claw; F. bearded orange. Red. $2\frac{1}{2} \times 2\frac{1}{2}$.

Fig. 138.—Iris lacustris.

Fl. bright blue F. marked with white, yellow, and deeper blue. Nat. size.

Phenological Observations.

Some notes have been kept of the extreme dates of flowering of the various species; they extend over a number of years, and serve to show what a wide range many Irises have, and how we may have Iris flowers continuously for about eight months in each year.

Only a few examples will be quoted now.

Iris	*Vartani*	. . . .	December	13	to	January	16
„	*Histrio*	. . . .	„	31	„	February	26
„	*stylosa*	. . . .	January	1	„	April	22
„	*Bakeriana*	. . . .	„	19	„	March	20
„	*histrioides*	. . . .	„	21	„	„	7
„	*Danfordiæ*	. . . .	„	27	„	„	5
„	*Krelagei*	. . . .	February	1	„	April	7
„	*reticulata*	. . . .	„	6	„	„	25
„	*tuberosa*	. . . .	„	23	„	„	25
„	*caucasica*	. . . .	March	22	„	„	25
„	*lacustris* (fig. 138)		April and May, and again in August				
„	'*Pumila*' group	. . .	April	15	to	May	30
„	'*Germanica*' group	. .	May	3	„	July	8
„	*Leichtlini*	. . . .	„	6	„	May	19
„	*susiana*	. . . .	„	22	„	„	30
„	*Korolkowi*	. . . .	„	23	„	June	8
„	'*Sibirica*' group	. . .	„	26	„	July	7
„	*virginica*	. . . .	„	31	„	„	6
„	*Boissieri*	. . . .	June	3	„	June	24
„	*Xiphium*	. . . .	„	10	„	July	7
„	*Pseudacorus*	. . . .	„	11	„	„	10
„	*ochroleuca*	. . . .	„	12	„	„	8
„	*xiphioides*	. . . .	„	18	„	„	14
„	*Kaempferi*	. . . .	. during July and August.				

The duration of each flower varies from one day only in *Iris arenaria*, three to five days in the Flag Irises and the greater number of species, to seven to ten days in the early bulbous kinds. In *Iris reticulata* the earlier flowers have a markedly longer duration than the later ones, which come perhaps for five or six weeks in succession; this is probably due to the paucity of insects in early spring retarding pollination, and may also be partly due to slower life from the lower temperature and lesser sun-power.

HARDY IRISES.

By W. J. Caparne, F.R.H.S.

To speak of Hardy Irises is to speak of very nearly all Irises; for, with the exception of perhaps half a dozen species which have crept outside the limits of the Northern temperate zone in which these plants are placed, all of them are hardy plants, and, as might be expected from this great range of distribution, very great variety of size, shape, colour, and habit exists in the 150 or so species which are found. This makes many of them very desirable and interesting garden plants, as species alone; whilst the work which has been done in improving some of these species has produced some of the most beautiful flowers we have, and offers great encouragement for the development of some of the others by the intercrossing of species or otherwise.

If we look for a few moments at the composition and construction of an Iris flower, and glance also at the construction of some near relatives of the *Irideæ*, we shall see with what simple material and by what simple means a wonderful variety of shape has been accomplished, and secondly that our Iris is achieved as an adaptation to both climate and insect, and often to a particular insect. Thus an Irid, as to flower, consists of stem, seed-vessel, and tube, which latter is more or less elongated, and develops into three broad sepals enclosing and protecting the three petals and the essential organs, which consist of three anthers with their respective filaments, three stigmas, and one style with three petaloid style-arms. On opening, the three broad sepals curve outwards, and are termed "falls"; the three petals remain upright and incurve or lie open, as the case may be, leaving exposed the stigmas for pollination. Now it is in the slight change of shape or size of any one of these sets of floral appendages, the development of one feature to the detriment of another, that we get the apparent variableness of the flower. The great change in shape which fixes an Iris in our mind is caused by turning three alternate petals up, and the three sepals down. This is formalised and preserved to us in the design of the *Fleur de lis* on our British crown and flag.

In climatic distribution the Cape abounds in Irids, yet possesses no true Iris. The Cape flowers are mostly fine-weather flowers. Many, as in *Ixia*, *Sparaxis*, *Schizostylis*, have their petals in an open cup-shaped form, pollen and stigmas perfectly exposed. It is true that they can close for night dews and wet weather, but wet absolutely ruins them. They expect fine weather and intense sunshine, hence see what colours they are able to revel in: the most brilliant scarlet, orange, yellow, and lemon to white; on the other side of the scale, towards blue (*Babiana* excepted) they stop short at deep red and crimson. There are certain devices for protection, as for instance in *Gladiolus*, where the flower is bent bodily over; also *Watsonia* (though a section of these latter, together with *Dierama* or *Sparaxis pulcherrima*), hang their flowers as bells upon a spike, but the idea of protecting the pollen-grains from

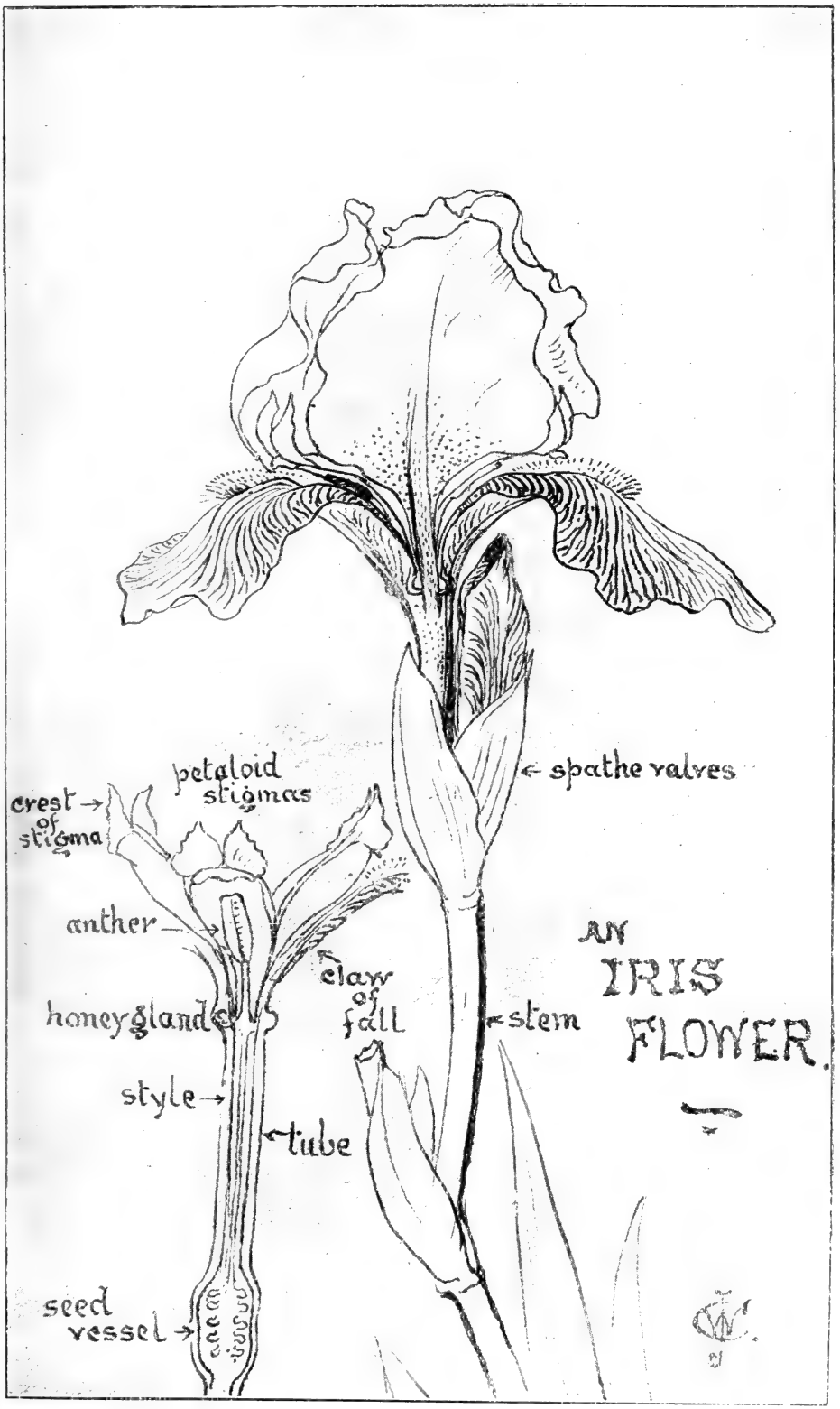


Fig. 139.—Details of Iris Flower

wet by holding an umbrella over them, and by making that umbrella out of the material of the style, seems to have been first achieved in *Morœa* and *Dietes*, and afterwards carried to great perfection in the North African and South European Bulbous Irises, where it forms the most attractive part of the flower, almost covers in the anther and its pollen, and provides a right of way for the right kind of insect, to the exclusion of others. This brings us up to the zone of Iris proper, which reaches its best development, naturally, around the Mediterranean basin, Central and Eastern Europe, and Western Asia. The true Iris is a variable-

Fig. 140.—Iris xiphioides, or English Iris.

climate plant, and has almost as its first principle of construction the protection of its pollen, first from rain, and then incidentally from all manner of insects which would be useless in pollen-carrying; and, as its very existence is dependent upon insects, first the encouragement of the right insect and then by special means to assure that this expected good should be done. This being satisfactorily settled in the main, the sepal, an advertisement, flag signal, or call to the insect, could be arranged as a sort of detail (dependent probably on the amount of this useful insect population in that district), and is, as we notice, small for South Spain, North Africa, Palestine; larger for North Spain, South France, Southern

Europe; much larger for Central Europe, Dalmatia, Cyprus, Asia Minor; and very large in Asia Minor, Persia, and the Caspian area.

To return, we notice, then, that the stigmas have been elongated, curved, strengthened by a midrib, and broadened out on either side into a tightly-

FIG. 141.—IRIS ALATA.

spread umbrella; that they have been endowed with attractive colouring; that at the upper ends the material of the upper surface has been produced into two crests, sometimes whole, sometimes fringed, dented or cut into an edge of amazing perkiness and 'aplomb,' whilst the under

surface ends in a lip (the stigma) which, when ready for pollen, slightly curls back and becomes humid—exposed, note, to a rub from an insect's bushy back *as it enters*, but closed from any touch by that insect on leaving. The anther, with its pollen, is securely tucked away under the arch of the stigma, and at the base where the junction is effected between the outer sepals are thin cup-like glands where the honey is situated. Note (1) that the pollen is useless where it is; (2) that it can only reach and fertilise a flower if carried by an insect; (3) that the insect, to reach it accidentally, as it were, must travel down the right way, and not take a short cut to the honey from the base. On this last problem and its many solutions hangs much of the interest, beauty, and strangeness of an Iris flower. First, given the sepal turned back as an alighting-board, which has been seen from a distance, strong lines drawn on this in the direction it is intended the insect should travel will tend to make him

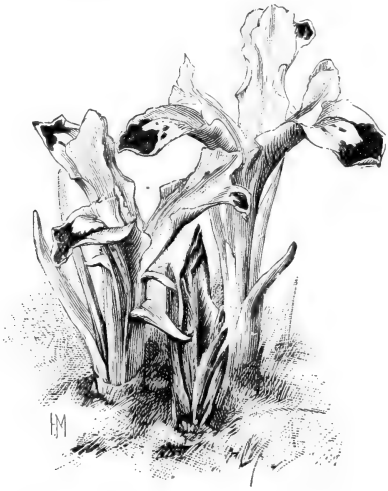


Fig. 142.—Iris persica (reduced).

travel so. We owe the markings on an Iris to this. (2) What if he alights clumsily and tries to force a way in at the side? This trouble *I. anglica* or *xiphioides* (fig. 140), *I. alata* (fig. 141), *caucasica*, *persica* (figs. 126, 142, 143), and I think all the 'Juno' section of Bulbous Irises, have successfully combated by the addition of a curling-up process on either side of the falls, on the narrow part called the claw; this gives a unique appearance to the flower. (3) But what if the insect is too small, sees the signal, follows the lines, gets the honey, and does not carry away pollen? The first effort to combat this is a compression of the stigma to the fall as in the *spuria* group. The second is to raise a median line, as in Bulbous Irises generally, and, where this is not sufficient, to enlarge it to a ridge as in 'Juno,' to a crest as in *cristata*, *verna*, *Milesii*, *fimbriata*, or to an irregular saw-like fence, as in *I. tectorum*.* (4) This crest tends to be a hindrance; at any rate it has only been used and

* This last is like a cock's comb, is white and splashed freely about with purple spots, a wonderfully strange and beautiful flower, not quite hardy perhaps one ought to say, but at any rate well repaying shelter.

developed for about six species of *Iris*; an attraction, therefore, was wanted which should be equally useful without this disadvantage. We have noted this raised median ridge as in Bulbous Iris, furrowed in the 'Juno' section. In *Iris hexagona* we find it furred.* The design which provides this efficient attraction is that of a beard or raised ridge of stiff hairs that can be coloured to look most tempting and perhaps to resemble pollen. This, then, has solved the difficulty and has given us the great race of Bearded Iris. These may be said to be European, though the largest of them, a few species of the *germanica* group, have been found towards

FIG. 143.—IRIS PERSICA.

Eastern Europe and Asia Minor; and it is noteworthy that the development of hairs as a means of checking unwelcome insects, together with a new function, that of fencing off wrong methods of getting at the honey, has been carried to its greatest perfection towards this area of Iris habitat, in the 'Oncocyclus' group of Cushion Irises, so called from the dense cushion of hair upon the falls; the standards too, and sometimes the stigmas, having hairs upon them to arrest progress of insects. The standards have these hairs upon their inner surface, which is really the "right side" of the petal, as may be readily seen in any splashed or well

* Fur has also been tried on another American Iris, *I. fulva*, but this seems as a development from a smooth sepal, and the fur is evenly spread. In culture this plant is not easily satisfied, or is not very free-flowering.

marked flower. *I. germanica*, too, has these hairs upon its standards, within the hollow of their foot-stalk or attachment, as one of its characteristics. *I. pallida*, too, will often show as dense a beard upon its standards as on its falls, not always equally, however, on the three petals. But that this question of hairs is a really important one I trust sufficient has been said to show, for although Iris is readily separable into a bulbous and non-bulbous section, yet, to go any further into their arrangement, the first and chief item to be considered is this question of hair. One may go through Iris and find every phase of development, even to eccentricity of each and every part of the flower in turn. In *I. paradoxa* the standards are enlarged to the suppression of the falls,

Fig. 144.—Iris xiphium, or Spanish Iris.

in *I. Pseudacorus* the falls to the suppression of the standards, in *I. Xiphium* (fig. 144) the stigma is developed, in *I. Vartani* (figs. 119, 145) the crest, and so forth; but one comes back to the broad distinction of Pogoniris—Bearded Iris, and Apogon or Beardless Iris, the *dry* and the *moist sections* respectively, to speak now from a cultivator's point of view; for, however it may come about, speaking generally, Beardless Irises (Bulbous excepted) delight in moisture, whilst the Bearded, of whatever kind, love a sunny dry spot, sun is absolutely necessary (in conjunction with sufficient food) to make them bloom, and the quality of their flowers in colour and in character is vitally dependent upon the amount of sun they get in both their growing, ripening, and flowering periods. That they are very hardy and vigorous in constitution is a fault; that they

will grow anywhere, even under trees, is another; but they will flower only, or only flower well, where and when the greatest amount of sunshine and free air has been attained. I know of no plant of equal possibilities which gives so poor a reward for the space it takes up as

Fig. 145.—Iris Vartani.

a clump of Bearded Iris let alone on a shady border since—the memory of the oldest inhabitant; and I know of no plant giving a richer treat if it may receive proper treatment itself. Food is the first great question. An Iris rhizome is a hungry thing, and requires a square meal each year to grow up to blooming size. This may take the form of

applied food or of a definite removal and relentless pulling to single pieces every second summer, as soon as it goes out of bloom if in your own garden, but if it has to be obtained from a distance the pulling to pieces may be preferably done in early autumn; and then, given the two conditions of food and sunshine, every Iris rhizome can be made to perform, as to its blooming, with the regularity of a Primrose.

Bearded Iris.

Out of the great array of Bearded Iris, some of whose members have been well worked upon by gardeners, even to the bounds of their possibilities, we make our chief choice of Irises for the garden. They are divided, broadly speaking, for garden purposes into tall and dwarf, early and late flowering. The distinction is only a rough one, for one or other species is sure to transgress. The early-flowering section contains many species eminently desirable from a garden point of view, inasmuch as they are very free-flowering, have immense flowers compared to the size of the plant, and will make a border gay with bright colour at a time of the year when flowers are scarce. Many new hybrids are appearing, and there is promise that this section of Iris will be made more use of in gardens than it has been in the past. It has no objection to being lifted and brought into early flower indoors, where it can be better seen and appreciated. Indeed its flower can be had through the winter months in perfection with greenhouse treatment, a light position near the glass, with air when in bloom, being desirable, or removal to cool quarters, when each bloom will last a week and a well-grown rhizome will produce ten or twelve blooms. (I speak of hybrids; species with a normal inflorescence would not exceed that normal.) After blooming and as soon as frosts are over, plant out again into the open, when each plant quickly becomes established and builds up new rhizomes for next year. Lifting should be done in autumn only for indoor flowering, and very little water must be given until growth has fairly set in.

Species of the Early-flowering Section.

I. pumila.—Three to four varieties. A very small plant, 2 to 3 inches; flower large in proportion, 4 inches high; type, red or claret-purple; single-flowered spathe. This is the earliest to bloom. The variety *cærulea*, which I have found to be quite sterile, is a very valuable plant, as also is the var. *bicolor*. White standards, purple falls.

I. pum. attica, a yellow-flowered form, is also very desirable. These plants are all most valuable for front borders, rockeries, walls, and exposed situations. They cover themselves with flowers and make a solid sheet of colour, and at all times of the year are neat, compact little plants, whose distinct foliage looks well in contrast with other plants of similar stature which we may assume to be planted near.

I. italica, a much taller plant, with rich purple flowers, two or more to a stem, and reddish spathe-valves.

I. olbiensis, reddish-purple, and *I. balkana*, a bronzy-maroon-red with a blue beard and unique paddle-shaped green spathe-valves, is very fine if one could get it. It has many understudies.

I. virescens, creamy-white with a greenish cast, falls slightly marked; these are plants of 6 to 9 inches in height (fig. 146).

Several Irises collected from differing South France, Riviera, Italy, and Greece stations seem to belong here as geographical varieties.

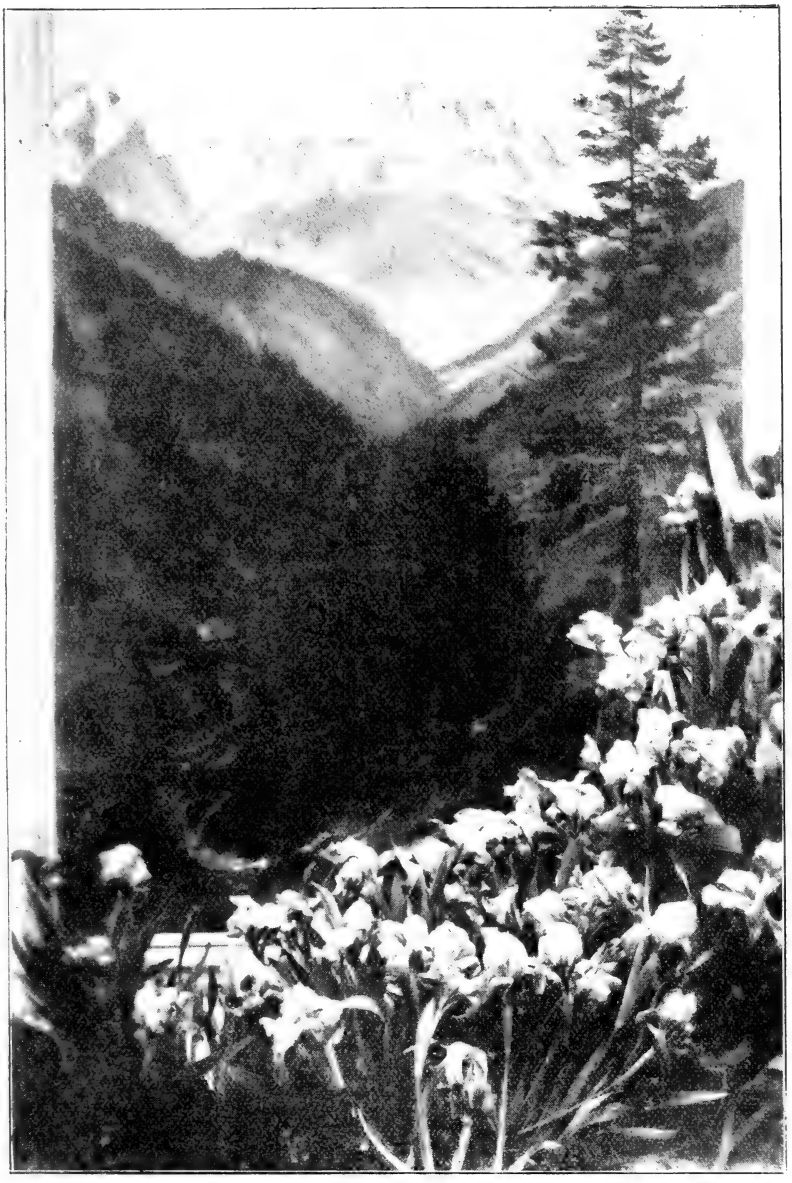


FIG. 146.—IRIS VIRESCENS BIFLORA IN SWITZERLAND. (*Caparne.*)

I. biflora is good in its several forms, has a longer season of blooming, a tendency to fork low down within the tuft of leaves and throw two stems as well as two flowers to a spathe. This quality appears in several

sub-species, as *I. Fieberi*, a splendid plant, and attains its greatest development in *I. nudicaulis*, a plant with sickle-shaped leaves a foot long and an inch or more broad, flower-stems a foot or more high, and the whole plant covered with a glaucous waxy secretion like the bloom of the grape. This latter plant has given some very distinct new hybrids in which the main simple stem has run up to 16 or 18 inches, and bears correspondingly large flowers, retaining, too, the distinguishing "bloom." *I. mellita*, a charming tiny species with rich bronzy-maroon flowers, and *I. rubro-marginata* with scarlet spathe-valves, very tiny indeed; these are rare and valuable members of this group, which one would like to enlarge upon did time and space permit.

Of the Tall Bearded Iris.—These are the Irises which from a general garden point of view stand first. They have had great attention paid to

FIG. 147.—ALPINE IRISES. (*Caparne.*)

them in the past, and, if flower-shows could come in Iris time, there is no doubt of their speedy advancement into public favour now. They have a most remarkable range of colour, every shade and tint of each and every colour imaginable, with this one exception—the scarlet and scarlet-red or orange. As was remarked of the Cape Irids, these scarlets, the missing colours in Iris, are the centre colours of Irids; and the difficulty of reaching blue in the Irids is paralleled by the scarlet in the other case. Blue—a water-colour expressible from many flowers, and capable of being used at once as a stain or pigment, seems typical of a wet or moist climate, such as I think our Iris is constructed for. It is, in fact, the centre colour. Now flowers that start from blue, as a rule, have not the slightest objection to reach pure yellow, or red-violet on the other side of the scale, and go

beyond to white, but they decline the pure red or red-scarlet, and when it is forced on them by hybridising the inherent blue blood gives a bronzy tinge. Flowers, in hydridising, it may be remarked here, behave as to colour mixture as the pigments on the artist's palette, and not according to spectrum. From this, and from many disappointments, I suggest that the desired colour will only be reached after this plant—a *variegata* for choice—has resided in and become accustomed to a hot dry climate, and that the success will occur there. The improvement manifested in an Iris flower of warm tints is most marked upon the advent of genial weather and heat; indeed, without these, many plants are utterly out of

Fig. 148.—Hybrid Alpine Iris. (*Caparne.*)

character, and in a cold, uncomfortable season, it may be said of the early-flowering sections more especially, blue splashes and stripes are apt to appear, which are not normally there, and should sunshine and a genial change come, the later flowers on the same plants are quite different. There are good and bad Rose seasons, and for similar reasons good and bad Iris seasons, quite apart from the failings which occur from a cultivator's point of view, though here the non-success of one season should lay down the programme for the next. One cannot leave the subject of Bearded Iris without referring to the very beautiful section of *Oncocyclus* or Cushion Iris. Garden plants these can never be;

decorative plants they are quite unfitted for. Curious, strange, and sad, they stand in their sober colours—simply beautiful. They seem to be the highest development of Iris. Born to an unhappy lot, they wend their way in little companies amongst us, almost saying the fateful words of the Roman gladiators: "Cæsar, we who are about to die salute thee."

Beardless Irises form the great race which abounds in America to the exclusion of almost any other, and crosses over to Japan, China, and Asia generally, within temperate limits. It has its finest development towards the west in *Iris aurea*, *I. ochroleuca*, and *I. Monnieri*, gets well into Europe, where the spell is taken up by *I. spuria*, our own *I. Pseudacorus*,

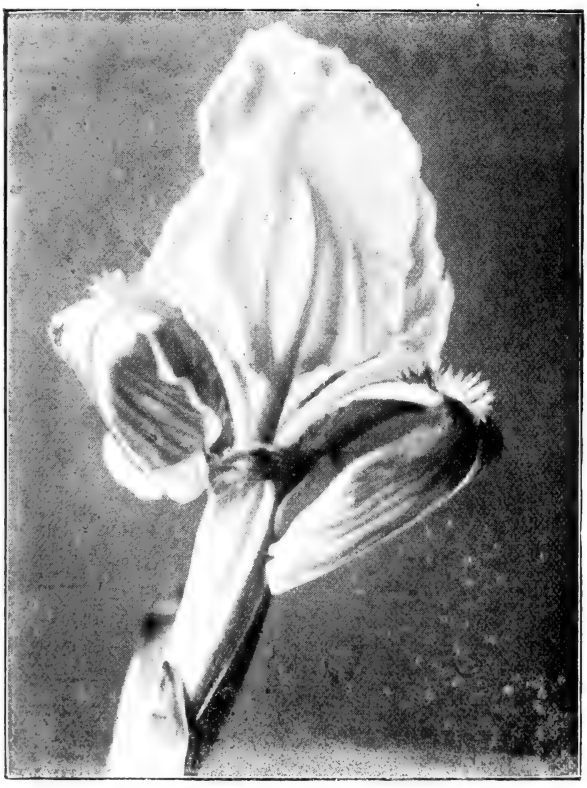


Fig. 149.—Hybrid Alpine Iris. (*Caparne.*)

and the striking *I. fœtidissima*, which has hit upon a new idea and gone into a scarlet blaze where one would least expect it—in its seeds, the pods of which open when ripe with as much apparent pride as a turkey is supposed to have. This for the larger-flowering and tall species. Of the smaller and more grassy-leaved species a very strongly marked plant, standing quite by itself, is *Iris stylosa*, of Algeria. In this species the tube has been developed to a stem of 9 to 12 inches, which I found grew at the rate of 2½ inches a day. It is a most desirable winter and early spring blooming plant, but it prefers a little protection and the flowers are safest indoors. Near to it is *Iris cretensis*, a plant of much smaller stature. These Beardless Irises are interesting, each and all of them, but

few are really decorative or garden plants for they have not yet been worked from their original state as wild plants. Exception must be made, however, for a few choicer species, such as *Iris Tolmieana* (*missouriensis*),

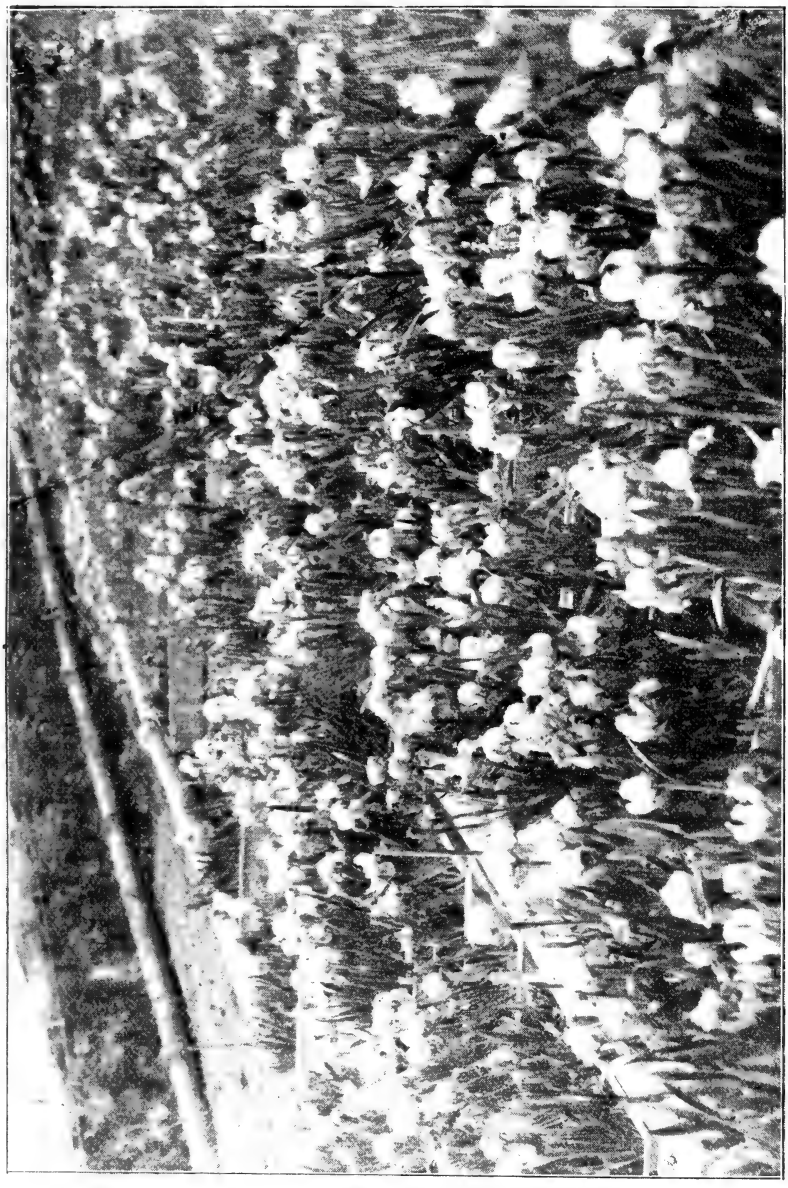


Fig. 150.—Hybrid Alpine Irises. (*Caparne.*)

a species with large pale lavender flowers and a valuable early-flowering propensity; *Iris setosa* (if you get it), flowers rosy-lilac; *I. sibirica*, in some of its varieties, is a very charming, free-flowering species. There is confusion here in the naming of a large-flowered variety of it

orientalis, *sanguinea*, and 'Oriel.' This is a very desirable and beautiful plant, with rich crimson spathe-valves, and deep purple flowers.

A word might here be said as to the confusion which exists through the synonyms of the older botanists and writers being still retained in some quarters, thereby figuring as independent species things one very possibly possesses already. And again, if I may be allowed to dogmatise, I think it is time a consensus of opinion was arrived at and settled as to a convenient name for the group of many differing species which constitute the early-flowering section of the Bearded Irises. At present they are called 'Pumila,' and new additions dubbed *pumila nova*: a cross, that

FIG. 151.—INTERMEDIATE IRIS. (*Caparne.*)

is to say, between *Iris Statellæ* and *I. biflora* gains the specific name of a totally different plant, to which it is not in the least related. To mend this state of affairs, and to fix the kind of plant, its requirements and its habitat (or the habitat of its near relatives when not a species), I have ventured to call them "Alpine Irises," from the habitat of many of the species; and the hybrids between such species or their progeny, "New Alpine Hybrids" (figs. 147, 148, 149, 150).

To return: that Beardless Irises have shown excellent results in the hands of the hybridists, the varieties raised by Sir Michael Foster between *ochroleuca*, *aurea*, and *spuria* fully demonstrate, and I trust that

the work may find the worker, but the culminating point in Beardless Irises must surely remain the great, beautiful, and wonderful cult of the Japanese in *I. Kaempferi*. These are beyond praise, and well worth our continued efforts to establish.

In conclusion, I trust that in the limits of this short paper an enumeration of the species has not been expected under the heading of each group. Iris has been well written of, and we owe a great indebtedness to Sir Michael Foster for Bulbous Irises, and to Mr. J. G. Baker for his collected and digested literature of the Iris, and his enumeration of the species in his 'Handbook to *Irideæ*.' One might,

Fig. 152.—Intermediate Iris 'Nimrod.' *(Caparne.)*

perhaps, wish for an enlarged and extended edition, and for a little clearing up in our minds of the many forms, specific and geographical, of some of the smaller rhizomatous Bearded Irises, if simplification be possible.

The idea of suggesting desirable varieties of a plant has many drawbacks, and I would only suggest it when the smallness of a garden precludes anything but a selection. The elementary notion of a selection is to pick only of the very best and all the plain colours only. The plain colours are all very well; they tell most when growing in the garden; but the very *best*—that is a matter of opinion, and is apt to change from year to year—it certainly does not mean the biggest, nor can one have the very best unless there is a little of the other thing to compare it

with, best being a comparison with good and better, without which the best lacks appreciation. But of Irises, flowers that rival Orchids in their remarkable presentation of colour, form, lighting and marking, each has

FIG. 153.—INTERMEDIATE IRIS 'IVORINE.' (*Caparne.*)

its own value in its own position, and with a reasonable background to see it from. That essential of a good and right background is of great importance in affecting both our judgment and our pleasure in the viewing of a flower. It is certainly not the green of garden surroundings

for any but simple colours. Flowers of complicated colour should *not* be grown in places where decorative plants are needed, but by themselves, where they can be examined and cut from without incurring unmerited depreciation. Thus I would suggest a bronze flower to be well seen

Fig. 154.—Intermediate Irises 'Reinette' and 'Queen Flavia.' (*Caparne.*)

when near or upon white, lemon, or yellow, alone or in combination. *I. squalens* vars. 'Socrates' (A. F. Barron), 'Salar Jung,' 'Mozart,' 'Greyhound,' 'Jacquiniana,' and 'Lord Grey' are simply splendid seen thus, but would be passed by as garden plants. Again, the appreciation

of colour is not a thing one is born with, but which one arrives at by experience, thought, and study.

Use Irises as cut flowers, and use them well, one would like to say, if you would grow fond of them.

Another thing that is essential to encouragement is to insist on your plants having a sunny position; this will, if they be fairly well fed, ensure bloom, and when bloom is assured look well after it, or your winter and spring slug will do so for you. Your winter slug will drill through the crown of every blooming rhizome. The spring slug and snail will not let your flower-spike get one foot high. Amongst the small spring-flowering plants, woodlice are often troublesome if on dry banks, living under the rhizome or in the inside of old and decayed ones; they feed on the growing tips of the new roots, which thus are never formed and the plant starves. The popular idea of Iris is that it is one plant, and that a water-plant. Artists are great sinners in this respect, for, carrying out the tradition, they will, when circumstances seem to demand it, show the driest sunniest loving Iris of, say, the *variegata* section, growing cheerfully out of ten feet of water. It is not all blame, however, for art people, in their ready acceptance and appreciation of this flower, have done something to keep its memory green. Still, look around, if you see an Iris in a garden anywhere (I mean in a popular sense). What is it? Just this—the old blue Flag, *germanica*, and none other. This is the one Iris as yet, and it is for the dawn of a better day that this wealth of very beautiful flowers should be spread abroad.

ALBINISM, WITH SPECIAL REFERENCE TO SHIRLEY POPPIES.

By John Bidgood, B.Sc., F.L.S.

Albinism occurs, perhaps more frequently than is often suspected, in the flowers of many plants. In the case of showy flowers, the horticulturist generally takes them in hand and perpetuates their peculiarity. When left to nature the "sport" is generally, no doubt, swamped by intercrossing with the type. For whilst in almost all cases in which experiment has been carried out the albinos have bred true when self-fertilised, or fertilised by their own kind, it has also been learnt, from the limited experience available, that when they are crossed with other species containing similar pigment—and presumably with the coloured type—their typical colours reappear. Thus two persons at least have self-fertilised *Cypripedium insigne Sanderæ*, and so far as the offspring have yet flowered they have all proved true. But in cases where this form has been made one of the parents of a cross with another species, the flowers of the progeny have reproduced in a greater or less degree the colour arrangement, and especially the spotting on the dorsal sepal of the typical *C. insigne* examples of this are *Cypripedium* × 'Actæus,' *C.* × 'Venus,' and *C.* × 'Helen.'

Amongst other albinos the white form of *Lilium Martagon* has been produced true from seed, and there is little doubt that *Linaria Cymbalaria alba* is another example ('Gardeners' Chronicle' Oct. 10, Nov. 21, 1903). But *Linaria* is a genus which Kerner says "exhibits considerable variation in the colours and markings of the petals, which is not to be attributed either to hybridisation or the influence of soil and climate." And *L. Cymbalaria* is a species which may vary from pale lilac to pure white (E. Bowles, 'Gardeners' Chronicle,' Oct. 10, 1903). Now in *Linaria* "the flowers never open spontaneously, but the insects which frequent them for honey have to open the door for themselves by pushing down the lower lip" (Kerner). And in default of visiting insects, and insects do make default at times, there is no cross-fertilisation of these flowers. But in addition to this *Linaria* bears cleistogamous flowers in which cross-fertilisation is impossible and self-fertilisation certain. It is therefore not surprising that, in the words of a correspondent to the 'Gardeners' Chronicle' Nov. 21, 1903, "This plant is growing freely and plentifully on an old wall near Carnforth, Lancashire, and whilst the ordinary form is on almost all the old walls in this district, on this particular bit of wall only the white form is found." Evidently, then, it comes true from seed, and since it is recorded from many places, from Italy to Lancashire, it is almost certain that the typical form has sported albinos many times.

In this connection it may be interesting to mention an *Adiantum* with

variegated fronds (green with white stripes), which every year produces in my fernery abundant offspring with every frond, even the first, variegated like the parent.

On the other hand, there is no evidence, so far as I am aware, that a self-fertilised albino has ever produced coloured offspring.

The term "albinism" may very well be restricted to the case of floral organs, and four forms of it may be distinguished :

1. *Incomplete Albinism*, when the intensity of the floral colour is diminished although the plant may be healthy and in vigorous growth. This is very common, and everyone knows these pale and washed-out forms.

2. *Complete Albinism*, when the colour disappears entirely from a flower, leaving it all white. *Cœlogyne cristata alba*, *Cattleya intermedia alba*, and many other examples are well known.

3. *Partial Albinism*, when one colour completely disappears from the floral envelope, leaving an underlying or overlying colour in full or diminished strength. Thus the dull brown colour of *Cypripedium insigne* is caused by purplish-red cell-sap in the epidermal cells overlying greenish-yellow chromoplasts in the deeper cells. In the sport *C. insigne Sanderæ* the reddish cyanin (red-blue pigment of the cyanic series) has entirely disappeared from all parts of the flower except the dorsal sepal, where a little is found, leaving the yellow or greenish-yellow pigment (of the xanthic series) to show alone. In *Odontoglossum luteo-purpureum*, as in many other Odontoglossums, the rich chocolate markings are caused by a cyanic pigment overlying a xanthic. In the form *O. luteo-purpureum sceptrum* the cyanin has disappeared and the flower is all yellow. In *O. crispum xanthotes*, *Cypripedium insigne Sanderianum*, *C. callosum Sanderæ*, and *C. Lawrenceanum Hyeanum*, we get similar results by the suppression of the surface colour. The orange-red colour of *Sophronitis grandiflora* is produced by a red cell-sap in its epidermal cells, which also contain yellow chromoplasts lying along their inner walls. When one or the other of these colours defaults we shall get a bright crimson or a yellow *S. grandiflora*.

It is rarer for the underlying colour to be wanting. In some colour-varieties of *Odontoglossum crispum* the xanthic pigment has failed, or nearly so, and the large blotches on the flower show a magnificent purple-red or deep crimson.

4. *Local Albinism*, when the colour completely disappears from a portion of the flower, leaving that part quite white. The albino form of *Lælia anceps* is an example of this. The violet-red colour of the flower is suppressed, but the palate is still deep yellow.

It is obvious that there may be combinations of these forms of albinism. Thus a flower may exhibit partial albinism locally, or incomplete albinism partially.

An example of local albinism occurs in the Shirley Poppy, and as there are unusual and interesting features in connection with these flowers, and their history is so well known to their selector, whilst their development has been so carefully guarded for nearly a quarter of a century, I have thought it would be as well to lay it before the members of the Scientific Committee. For the history of these flowers I am

indebted to the account given in the R.H.S. Journ. Nov. 1900, and to further information kindly supplied to me by the Rev. W. Wilks.

The progenitor of all the Shirley Poppies was the seed of a single flower of *Papaver Rhœas* which Mr. Wilks found in 1880 growing in a clump of these plants in a waste corner of his garden, abutting on the fields. This flower, which had a narrow white edging to its four petals, was marked and its seed saved and sown. Next year, out of 200 plants there were four or five on which all the flowers were white-edged. The best of these were marked and the seed saved, and so on for several years, the flowers all the while getting a larger infusion of white to tone down the red until they arrived at quite a pale pink, and one plant absolutely pure white with the exception of the black blotch at the base of the petals.

Up to this stage the black blotch was found in all the flowers, when suddenly it disappeared from one plant. There was no gradual toning down of this colour, as in the upper portions of the petals, no intermediate brownish blotches. It just failed suddenly and completely, leaving a white blotch in its place. Then, by careful selection of all plants which had white centres, in about thirteen years the black colour was entirely eliminated from the whole race. Mr. Wilks says that for several years past his strain of the flowers has not given him one black rogue.

This is not the case with seed supplied by the trade, but obtained originally from Mr. Wilks's stock. They throw black rogues fairly often, no doubt, because they have not been so carefully guarded as the others. There is the less danger of the original stock being contaminated that Mr. Wilks's garden is now surrounded by grass fields and woods where the type form does not grow. He is still working at them in the hope of some day obtaining a true yellow *Papaver Rhœas*, and he has already arrived at distinct shades of salmon. I venture to predict that, whilst he may well expect to obtain white forms again, yellow ones are beyond his reach.

There are some points to be noted about these plants:

(i.) The race has been obtained by simple selection. It is still a pure species although an albino race. No admixture of any other species has caused variation.

(ii.) The race breeds true. So long as they pollinate one another they produce no black-centred flowers, and the upper portions of the petals all show incomplete albinism.

(iii.) Whilst the scarlet pigment of the upper parts of the petals has gradually diminished for twenty-four generations and is not yet suppressed, the black centre disappeared suddenly and completely. This would appear to indicate that the two pigments are distinct.

(iv.) There is no reason to suppose that cultivation has had any effect whatever in diminishing the pigment. Seeing that in a state of nature there are species with individual differences in colour-intensity, as well as albino races, the probability is that if Mr. Wilks had grown, selected, and guarded these Poppies in a cornfield, with as much care as he has in his garden, he would have achieved the same result, and it is not impossible that it would have been arrived at in a shorter time. For so long as it is the general opinion of horticulturists that cultivation tends to increase

colour-intensity, it is not reasonable to suppose that it has diminished that of Shirley Poppies.

One would like to be able to formulate some theory as to the total disappearance of the one pigment, and the progressive disappearance of the other, in this as in plants generally.

Darwin's hypothesis of Pangenesis assumes that each particular hereditary quality is determined by the presence of a special transmitting body, or material-bearer of this quality, in the germ-plasm of one or both of the parents. The hypothesis seems to be peculiarly applicable to the inheritance of pigment, which is itself a material. Adopting this hypothesis—and it seems the only possible one in the present state of our knowledge—it may be applied to the sudden disappearance of the central colour in Shirley Poppies, and to other albinos, in this way.

Absence of colour means absence of pigment, and absence of pigment signifies absence of the material substance in the plant which by interaction with other substances produces the pigment. This is the substance which Reinke has called *chromogen* ('Zeitschrift für Physik und Chemie,' t. vi., 1883). From the earliest moment of the plant's life there must have been, therefore, an absence of a certain material which is the generator of this pigment. So that it seems reasonable to assume that the germ-plasms of its parents, which by conjugation bred the little plant, wanted the material-bearer of this quality—the determinant for the central pigment of the flower.

Assuming that the first plant which bore white-centred flowers was developed from an egg and a pollen-cell which had no determinants for the black central pigment, the two parents must have come together fortuitously. If this was the first time such determinants had failed, the chances that these two should come together are incalculable, and it is therefore more reasonable to suppose that previous egg and pollen cells had failed in this determinant, but that two such had not previously, so far as is known, come into conjugation.

Mr. Wilks informs me that he does not know of any instance of a Shirley Poppy having been crossed with the typical form, but that he is convinced that is the reason for the occasional production of black-centred flowers from the trade-sold seed of Shirleys. It is extremely desirable that this crossing should be done, and the progeny tested for the operation of Mendel's Law, for the character is apparently never transmitted reduced by one half, in Macfarlane's words, and it is therefore a clearly-cut differentiating character about which no one could make a mistake. I expect that Mendel's Law will be found to apply to this.

The gradual disappearance of the other pigment shows that the colour-determining substance for that is progressively diminishing, and that therefore a determinant, at any rate for colour, may be present in the germ-plasm to a greater or less extent. Because every generation shows less of this pigment in the flowers, every generation must have less of this particular colour determinant in the nuclei of the egg and pollen cells.

Very late in the past season, too late to do much with them, and in the course of examining the colouring-matter of flowers generally, I selected some flowers from a large bed of Shirley Poppies, and gave them a short examination. The seed had been obtained commercially, and

amongst the plants were some which showed incomplete albinism in the upper portions of their petals, whilst their centres showed local albinism, or in a few cases retained the black colour of *Papaver Rhœas*.

On cutting sections through the two colour regions I found that the black appearance was wholly caused by a very strong solution of a dark red pigment dissolved in the cell-sap of the epidermal cells on both surfaces of the petals. It is very much the rule that black colours in plants are produced by a dark red or crimson cell-sap overlying cells containing abundant chlorophyll. This is how the black blotches on the leaves of *Arum maculatum*, the black stripes on some of the leaves of *Ranunculus Ficaria*, and the black colour on the dorsal sepal of *Cypripedium Boxallii* are produced. An exception is *Cœlogyne pandurata*, where the dead-black colour on the labellum is caused by a gelatinous non-granular pigment-mass which fills the epidermal, and in some places the deeper-lying cells. This is black, reddish-brown, orange, or yellow, according to the thickness of the cell-section obtained, and is a pigment of the xanthic series.

The pigment in the upper portions of the Poppy petals was also contained in solution in the cell-sap of the epidermal cells, but varied in different flowers from a pinkish-red to an orange-red. No especially close search was made for chromoplasts either in these cells or in the underlying ones, but none were observed, and it is not probable that any are present.

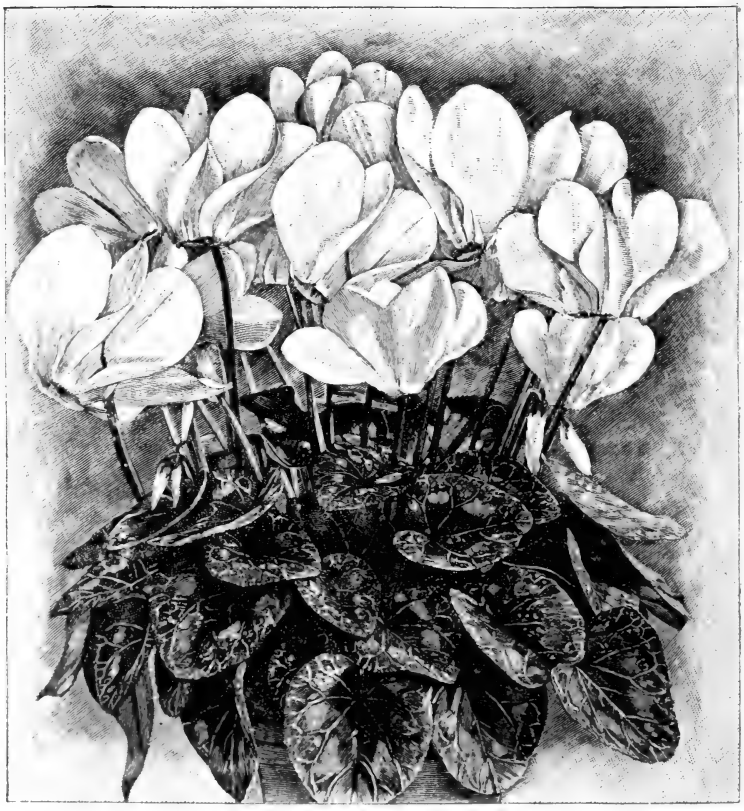
On applying microchemical tests it was found that the behaviour of the pigments of the two regions in question differed. The following table shows the principal results :

Reagent	Black Blotch	Upper part of Petals
Concentrated sulphuric acid.	Pink, then brick-red inclining towards a deep orange.	From pink to brick-red, then through orange to yellow until the colour is discharged.
Iodine in potassium iodide.	In a quarter of an hour the colour had changed to a port-wine tint. No further change.	The colour slowly faded out without any change of tint.
Solution of caustic potash.	At once a very deep blue. Then lighter and lighter, until it bleached out without any change of tint.	Through green to light greenish-yellow. Slowly then the colour bleached out entirely.

It thus appears that the pigments are distinct, and this supplies one reason why the one may disappear completely whilst the other may persist.

Whilst both pigments belong to the cyanic series, neither of them shows the typical reactions of the commonest members of this series. The central black colour is certainly produced by a single-colour substance ; that of the rest of the petal may not impossibly be a mixture of a cyanic with a minute portion of a xanthic pigment, and if that is so it helps to explain the difficulty of getting a completely albino *Papaver Rhœas*. For it is much rarer to get an albino of the xanthic than of the cyanic pigments.

A further and more complete examination is needed, but this must be deferred until plenty of material is available. Three things appear to be desirable. The first is to make a macrochemical and spectroscopic examination of the Poppy pigments. The second, to determine whether the raw material of the pigment (chromogen of Reinke) exists in the albinos, and whether the colour may be, for instance, brought out by oxidation. The third is to cross the albino with the type and determine whether all the progeny is typical to the second generation. For the pigment of the centre of the flower appears to be a character clearly differentiating the typical from the albino race, and Mendel's Law may well be tested by means of it.



EXPERIMENTS IN THE HEREDITY OF PEAS.

By Charles C. Hurst, F.L.S., F.R.H.S.

The following is a preliminary account of a series of experiments commenced in 1902 with garden Peas (*Pisum sativum*). The primary object was to repeat Mendel's original experiments as closely as possible, and test his principles of heredity. (Mendel 1865, Bateson 1901.) The secondary object was to endeavour to ascertain more fully the precise nature of Mendel's categories of seed shape and cotyledon colour in Peas. (*Cf.* Weldon 1902.)

[For a translation of Mendel's original work, see R.H.S. Journal, vol. xxvi., pages 1–33, 1901.]

Seed Shape.

For many years it has been the custom in gardens to divide the ordinary races of white-flowered Peas into two classes, "Round" and "Wrinkled." In the "Round" class are included all those with round, roundish, or rounded seeds, the surface of the seeds being either quite smooth or slightly pitted. In the "Wrinkled" class are included all those with angular, squared, or flattened seeds, the surface of the seeds being deeply dented, broadly wrinkled, or shrivelled. The precise nature of wrinkling in Peas does not yet appear to have been determined, but Mr. Bateson cites the analogous case of Round and Wrinkled Maize, in which the "Round seeds contain much unconverted starch, while in the Wrinkled or Sugar-maize this seems to be converted in great measure as the seed ripens; with the result that on drying the walls collapse. In such seeds we may perhaps suppose that the process of conversion, which in round seeds takes place on germination, is begun earlier, and perhaps the variation essentially consists in the premature appearance of the converting ferment." (1902, p. 123.)

Mr. Bateson proceeds to say that it would be rash to suggest that such a process may be operating in the Pea; but when we consider that wrinkled Peas are usually sweeter than round ones and will not germinate so well as round ones if sown too early, and in a dry state do not retain their vitality so long as round ones, it seems probable that the nature of wrinkling in Maize and Peas may not only be analogous but identical. It is to be hoped that the chemists will take the matter up and ascertain the precise nature of Round and Wrinkled Peas. In carrying out my experiments I have been much impressed by the observation of the powerful influence of the conditions of life on seed shape in Peas, and though my evidence is not yet complete, I think that there is no doubt that some, at all events, of the angularity, squareness, flattened sides and deep dents are directly caused by the pressure of the Peas against one another in the pod, and also by the constriction of the pod itself. I find that, as a rule, the roundest Peas are small, or have plenty of room in the

pod, while the most wrinkled Peas are large or are tightly packed in the pod. It seems likely, therefore, that a great deal of irregularity in shape, found in certain races with large round seeds may be directly due to the struggle for growth among the Peas within the pod, altogether in spite of the hereditary tendency to roundness. In the majority of races, the two classes "Round" and "Wrinkled" are distinctly discontinuous, and breed true to type when self-fertilised, so that it is hardly possible to confuse one type with another. In some cases, however, as Professor Weldon has carefully pointed out, there is a considerable range of variation both in the "Round" and "Wrinkled" classes, forming in a few cases an almost continuous series between the two (1902, pl. II.), and Mr. Bateson even goes so far as to suggest that some races are normally intermediate in shape (1902, p. 123). Professor Weldon admirably sums up the ordinary discontinuous nature of the "Round" and "Wrinkled" categories, as follows: "The categories are undoubtedly often discontinuous, the most wrinkled seed of such a (round) race as 'Empress' or 'Victoria' being so much smoother and more rounded than the most regular seed of the typically 'wrinkled' races that no one who knows both races would hesitate for a moment in deciding which race a given seed resembled." (1902, p. 236.) We may therefore safely say, that in regard to seed shape at all events, Mendel's categories of "Round" and "Wrinkled" ("angular") are distinct and unambiguous. In selecting the "Round" and "Wrinkled" races for my own experiments, I thought it would perhaps simplify matters still more if I selected, for the first experiment, two races which showed but little variation in seed shape. For the "Round" race I chose 'Harrison's Early Eclipse,' and for the "Wrinkled," 'British Queen.'

Both races have been intimately known to me for twenty years, and I have always found them reliable in their respective characters. Messrs. Harrison & Sons of Leicester kindly inform me that their 'Eclipse' was originally a selection from the round blue-seeded 'Harbinger' introduced by Laxton early in the seventies. Mr. N. N. Sherwood, in his useful and interesting paper on Garden Peas in this JOURNAL, states that 'British Queen' is a direct descendant of 'Knight's Tall Wrinkled Marrow' (1899, p. 251), which was apparently obtained by Knight (that famous experimenter in horticulture, and former President of the Royal Horticultural Society) from his numerous crossings between white and purple flowered Peas in 1787. Though the details of Knight's experiments are not altogether clear (1799, p. 195), yet it is interesting to note that in many respects they plainly anticipated Mendel's own results. For instance, in the dominance of tall habit over dwarf, purple flowers over white, and "grey" (brown) seed coats over white; also in the immediate fixing of the tall dominants and the white-flowered and white-coated recessives, both by self-fertilisation ("simple culture") of the tall purple-flowered and grey-coated hybrids, as well as by recrossing with one of the parent forms. Previous to Mendel's discoveries being made known, Knight's experiments with Peas were practically unintelligible, but now, in the light of Mendel, they appear quite obvious. There is no doubt as to the antiquity of the 'British Queen' race, otherwise known as 'Knight's Tall Wrinkled Marrow,' and if it originated from Knight's crosses in 1787

it provides an interesting illustration of the vigorous persistence of a race after more than a hundred generations of close inbreeding by self-fertilisation.

In order to simplify the experiments still more, I selected sub-races of both 'Eclipse' and 'British Queen' as follows:

I first selected individual seeds of 'Eclipse' which were apparently perfectly round and smooth (save, of course, for the slight suture or seam at the base of the seed); to be precise, all these seeds were rounder than Professor Weldon's roundest Peas of Lightning (1902, pl. II., fig. 13), and equally smooth. These seeds were sown and produced plants which gave precisely similar seeds, perfectly round and smooth, with no trace of irregularity or pitting. This apparently constant sub-race of 'Eclipse' produced the parent plants used in the experiments.

In the same way a sub-race of the most wrinkled 'British Queen' was selected. Individual seeds were chosen which were all angular, flattened, deeply-dented, and broadly wrinkled, without a trace of either roundness or smoothness; these may be compared to Professor Weldon's most wrinkled Peas of 'Telephone' (1902, pl. II., fig. 6). These seeds were sown and produced plants which gave similar seeds. This apparently constant sub-race of 'British Queen' produced the parent plants used in the experiments.

First Generation (F_1).

EXPERIMENT 1.—'British Queen' ♀ × 'Eclipse' ♂
(Wrinkled ♀ × Round ♂).

A specimen plant of 'British Queen' was selected as the seed parent, and as soon as the first flower-buds appeared, the sepals, standard, wings, keel, and immature stamens were all cleanly removed at an early stage, and at the same time the ripe pollen of a partially-expanded flower of an individual plant of 'Eclipse' was applied in profusion, completely covering the susceptible surface of the pistil. In a few days the pods began to form and ultimately 19 hybrid seeds were developed, all of which were round when dried, thus demonstrating once more the dominance of round seeds over wrinkled, and confirming the previous experiments of Mendel (1865), Correns (1900), Tschermak (1900–1901), and Bateson (1902). These dominant hybrid Peas, though technically round, were slightly imperfect in their roundness, all being practically the same shape. They may be described as rounded, with slightly elongated apex, and rather flattened sides; all were practically smooth with faint traces here and there of both slight pitting and feeble wrinkling; they compare well with Professor Weldon's 'Telegraph' (1902, pl. II., fig. 2A), except that their surface is much smoother. There is not yet sufficient evidence to show whether these slight imperfections of roundness are due to the conditions of life or to incomplete dominance, or both, but so far the evidence seems to point towards the former rather than the latter, as all the Peas were large and were packed tightly in the pods, and it is indeed difficult to imagine how any of them could have been perfectly round under these conditions, whatever the hereditary tendency might have been.

This shows the necessity for caution in ascribing irregularities of seed shape to failure of dominance without first eliminating the influence of the conditions of life. It is obvious that size and weight, when considered as attributes in heredity, must necessarily be unreliable amid the changing conditions of life, yet it may be noted, with all due reservation, that in the parent seeds 6 of the largest 'British Queen' just balanced 16 of the largest 'Eclipse,' while 5 of the largest hybrid seeds balanced the same 16 'Eclipse.' As size and weight appear to correspond fairly in seed Peas, this suggests that in hybrid Peas size is a purely maternal character, unlike shape, which is a hybrid character. Professor Correns has arrived at a similar conclusion in regard to the size of hybrid seeds of Maize (1901).

Second Generation (F_2).

DR × DR

In 1903, 14 of the dominant round hybrids raised in Experiment 1 were duly sown: these produced 12 hybrid plants which, self-fertilised, gave 1,755 seeds in the second generation. These seeds were distinctly of two types, round and wrinkled, both types being often produced in the same pod; some pods contained all round, but none contained all wrinkled.

The following is a list of the numbers of each type produced by the 12 individual plants:

Expt.	D Round.		R Wrinkled.
2	27		6
3	32		4
4	24		11
5	378		125
6	15		5
7	135		36
8	62		12
9	203		52
10	287		107
11	85		30
12	72		25
13	15		7
	1,335		420
Actual ratio	3·1 D	:	1 R
Mendelian ratio	3 D	:	1 R

Out of the 1,755 seeds of the second generation 1,335 were round dominants, and 420 were wrinkled recessives, giving a ratio of 3·1 D : 1 R, which is close to the 3 : 1 expected by Mendel's law. It will be observed that in individual plants where the numbers are few the ratios fluctuate considerably, but where the numbers are 100 and over the ratios are on the whole fairly constant. This shows the necessity of dealing with large numbers in all quantitative experiments in heredity, otherwise the ratios will be irregular. On the other hand, a few numbers will suffice for qualitative experiments, as may be seen in the above experiments; a dozen seeds

would generally be sufficient to secure both the dominant and recessive types. With regard to the precise nature of the dominant and recessive characters in the second generation, no appreciable difference can be perceived in the respective seeds of the different experiments, so that we will take the seeds of Experiment 5 to represent them all.

The wrinkled recessives in Experiment 5 are practically indistinguishable from the seeds of the pure recessive grand-parent 'British Queen,' as far as shape is concerned; all are angular, squared, flattened, with deep dents and broad wrinkles.

The Round dominants in Experiment 5 are all unmistakably round, with no intermediate forms tending towards the wrinkled recessives: they are, however, slightly variable in their roundness and smoothness. For convenience they may be divided into three groups, though, as a matter of fact, the groups are almost continuous.

In order to enable others to identify and gain a clear idea of these three groups, I have compared them as closely as possible with Professor Weldon's photographs of seed shapes in Peas (1902, pl. II., figs. 1–18), and in quoting the figures by number, where there are two peas in Professor Weldon's groups, I will term them respectively A and B, reading from left to right, in the same direction as the numbers.

Out of 100 full-sized round seeds raised in Experiment 5, 9 may be referred for shape alone to fig. 2A, and for smoothness alone to fig 1B, all being nearly round and perfectly smooth: 72 may be referred to fig. 2A for both shape and pitting, though in all, the pitting is less extensive and pronounced: the remaining 19 may be referred to fig. 2B, being slightly irregular in shape, with shallow dents. It will be noted that 72 per cent. of the dominants of the second generation are similar to the dominant hybrids of the first generation, while the rest comprise a small percentage, varying on either side of the majority, and it seems probable that, if 100 seeds of the first generation could have been compared together (instead of the 19 actually compared), all these three types would have been found in the same proportions as in the second generation. In any case it seems likely that the slight imperfections of roundness and smoothness in both generations are due to the action of similar causes. That one of these causes is *not* the influence of the recessive character (causing incomplete dominance) is suggested by the fact that none of the dominants in the second generation are exactly like the pure dominants, and yet by Mendel's law one-third of them should be pure dominants; so that altogether it appears fairly clear that in both the first and second generations the imperfections of roundness and smoothness are in some measure due to the conditions of life rather than to heredity. It was further observed that the 9 per cent. perfectly smooth seeds in the second generation were all smaller in size than the others, and the 19 per cent. which were the most irregular were the largest seeds of all; evidently, therefore, size is also a factor to be considered, and it is hoped that an examination of the third generation will determine this difficult and complicated question.

With regard to the size of the seeds of the second generation, they are sensibly smaller than those of the first generation. As a matter of fact, if the size of the seeds is a purely maternal character, as it certainly appeared

to be in the former generation, then in this generation it should behave really as a first hybrid character, say intermediate between the size of 'British Queen' and 'Eclipse.' Judging, as before, the size by the weight, I found that six of the largest 'British Queen' seeds just balanced sixteen of the largest 'Eclipse,' while in these hybrids I find that it takes eight of the largest seeds to balance either the six 'British Queen' or the sixteen 'Eclipse.' If the hybrid seeds were exactly intermediate between the parents, the ordinary mean would be 11, and the true mean 9·7, so that broadly speaking the hybrid size favours the 'British Queen' parent slightly more than the 'Eclipse.' But there are other complications which may possibly account for this departure from the mean; for instance, all these hybrid seeds were borne on extraordinarily vigorous hybrid plants seven to eight feet high, in which the tall 6½-feet 'British Queen' parent was distinctly dominant over the dwarfer 2½-feet 'Eclipse' parent, thus again confirming Mendel's experience, in which the tall character was always dominant over the short character.

This was the case with all my twelve hybrids (Experiments 2–13), and, just as Mendel found, the dominant hybrids exceeded in height and vigour the pure dominant parent (Mendel 1865, Bateson 1901). It seems reasonable to suppose that such extra vigour in the hybrids would affect the size of the seeds borne thereon. It may also be worthy of note that the flowers of the hybrids (Experiments 2–13) were precisely similar to those of the 'British Queen,' having the large, substantial, pure white flowers of that parent, with no trace of the small, semi-transparent, greenish-white flowers of the 'Eclipse.'

These comparisons were made at the same time, all the plants, hybrids and parent races, being grown side by side in similar soil, being practically under the same conditions of life.

Cotyledon Colour.

Although seed shape in Peas depends on the shape of the cotyledons, it can be easily determined without removing the seed-coat or outer skin. On the other hand, in some races the cotyledon colour is masked by the more or less thick and pigmented seed-coat.

In gardens, it is customary to divide ordinary Peas into "green," "white," and "blue." The "white" Peas have usually yellow cotyledons, and the "green" ones green cotyledons; but in some cases "green" varieties with a thick green skin have yellow cotyledons: "blue" Peas have usually green cotyledons seen through a semi-transparent skin. It is, therefore, not at all safe to judge the cotyledon colour in all races by the outward appearance of the seed; and in order to determine the cotyledon colour in the thick-skinned races, the seed-coat has to be removed.

If this be done entirely the germination of the seed is naturally affected, so that in these experiments it was thought desirable to select races whose seed-coats were more or less transparent. In 'British Queen' we have a "white" seed with yellow cotyledons obscurely seen through a white seed-coat; in 'Eclipse' we have a "blue" seed with green cotyledons more clearly seen through a white seed-coat. In both cases the seed-

coat is more or less transparent, the skin being rather thicker in the former than in the latter; in both cases, too, the white seed-coats themselves contain varying amounts of green pigment when the seeds are not well ripened, and if the seeds are gathered prematurely this green pigment persists. Great care is, therefore, necessary in dealing with these complications in seed-coat colour, and the whole question bristles with difficulties owing to the changing conditions of life. When we come to deal with the heredity of cotyledon colour, the necessity of carefully eliminating the question of seed-coat colour becomes even more evident. There is a vital difference between the hereditary nature of cotyledon colour and that of seed-coat colour, inasmuch as the cotyledons, representing as they do the first two leaves of the hybrid plant, are hybrid in their nature, partaking of the qualities of both parents, while on the other hand the seed-coat is purely a maternal structure, so that it is possible to have two distinct generations present in one seed. For example, in Experiment 1, where a plant of 'British Queen' was fertilised with pollen of 'Eclipse' in the summer of 1902, the ripe seeds resulting from that cross, gathered in the autumn of the same year, were true hybrids of the first generation, as far as the shape and colour of the cotyledons were concerned, but the seed-coats of the hybrid Peas were purely maternal, *i.e.* 'British Queen,' being as much a part of the mother plant as the pods. When the hybrid seeds were sown in 1903, and grew into hybrid plants of the first generation in the same summer, they were allowed to self-fertilise, and the resulting seeds, gathered in the same autumn, were, as far as seed shape and cotyledon colour were concerned, hybrid seeds of the second generation (Experiments 2–13); but the seed-coats of these same seeds were maternal, *i.e.* hybrids of the first generation; and so on with all the generations. It is true that, occasionally, the foreign pollen does apparently influence the maternal seed-coat and even the pod, and Darwin (1868, p. 428) has collected a number of such cases from the experiments of Gärtner, Berkeley, and Laxton. This "infection," or, as Darwin terms it, "the direct or immediate action of the male element on the mother form," is now generally known as *Xenia*, a term suggested by Dr. Focke. Curiously enough, in all my experiments, I have never yet met with a clear case, though I have often suspected it. In some cases, however, I quite appreciate that even if it did occur it would be a difficult matter to establish it clearly. Professor Correns goes so far as to doubt it altogether (1901 B.), but Mr. Bateson regards it as a substantial fact in *certain races* (1902, p. 139). In view of all the complications it will be seen how absolutely necessary it is to regard the cotyledon colour altogether apart from the seed-coat colour. Ordinary garden Peas have as a rule cotyledons either yellow or green.

The precise shades of these colours vary in different races, in different Peas of the same race, and even in the cotyledons of the same Pea. Generally speaking, however, I have found many races quite constant, much more so, indeed, than in seed shape.

With regard to the nature of the two colours, Mr. Bateson admirably puts it: "In the green certain pigmentary matters persist in the ripe seed which disappear or are decomposed in the yellow as the seed ripens." (1902, p. 120.) Thus it may be said that all Peas are green, but that some remain green while others change into yellow as they ripen. It has

been the custom, apparently, for most observers to take the cotyledon colour of a Pea from the outer surface only: that is, the surface immediately beneath the seed-coat (*cf.* Weldon, 1902, pl. I.); but in my experiments I have not found that to be a true test of cotyledon colour. I prefer to separate the cotyledons and observe the internal colour also. True yellow cotyledons have usually the outer layer yellow, while the larger area within is creamy yellow, shading to white. True green cotyledons have usually the outer layer green, though sometimes this is yellowish or even clear yellow, but the larger area within is always green, shading to a lighter green. In the 'Eclipse' race, for instance, I have found odd seeds which, when peeled, had apparently yellow cotyledons instead of the usual green, but when the cotyledons were separated they were found to be quite green in the large area within.

In dealing with cotyledon colour it therefore seems necessary to observe the inner surface of the cotyledons as well as the outer.

The sub-races of the 'British Queen,' used as a parent in the experiments, had the outer surface of the cotyledons a deep shade of yellow, which, following Professor Weldon's colour scale (1902, pl. I., figs. 1–12), compares best with fig. 5; the inner surface of the cotyledons was creamy white. This dark yellow sub-race proved quite constant from seed. The sub-race of 'Eclipse,' used as a parent in the experiments, had the outer surface of the cotyledons a deep shade of green, which was a full shade darker than the darkest green shown on Professor Weldon's colour scale, fig. 1; the inner surface of the cotyledons was a lighter shade of green. This dark green sub-race proved quite constant from seed.

First Generation (F_1).

EXPERIMENT 1.—'British Queen' ♀ × 'Eclipse' ♂.
(Yellow ♀ × Green ♂.)

As previously described, a single plant of 'British Queen' was crossed with pollen of a single plant of 'Eclipse,' and produced 19 hybrid seeds, all of which had yellow cotyledons when dried, thus once more demonstrating the dominance of yellow cotyledons over green, and confirming the previous experiments of Mendel (1865), Correns (1900), Tschermak (1900, 1901), and Bateson (1902). Three of these hybrid yellow seeds were peeled and the cotyledons separated; two were retained whole for reference, and the remainder were sown, a slight portion of the seed-coat having been previously removed from each to compare the actual shade of the outer surface of the cotyledons with those that were peeled and separated. The outer surface of the cotyledons in all these dominant hybrids was found to be an intense shade of yellow, but curiously enough all were uniformly a darker shade of yellow than the pure dominant parent 'British Queen,' thus being a shade darker than Professor Weldon's darkest fig. 5 (1902, pl. I.).

This increased intensity of tint in the dominant hybrids of the first generation was quite unexpected; but, as the sequel shows, the results of the second generation provide a clue to the mystery. The inner surface of the cotyledons in those examined was creamy yellow, being also darker than the pure dominant, which was creamy white.

In the first generation, therefore, the dominance of yellow cotyledons over green was absolute and exclusive, there being no trace of green either without or within the cotyledons. As shortly to be seen, the green colour, though not patent in the first generation, was nevertheless latent, reappearing in full strength in the second generation, exactly as Mendel demonstrated (Mendel 1865, Bateson 1901).

Second Generation (F_2).

DR × DR.

Fourteen of the dominant yellow hybrids raised in Experiment 1 were sown, and, as previously described, produced 12 hybrid plants which, self-fertilised, gave 1,755 seeds in the second generation. The cotyledons of these seeds were of two distinct colours, yellow and green, both colours being often produced in the same pod; some pods contained all yellow, but none contained all green. The following is a list of the numbers of each colour produced by the individual plants:

Expt.	D Yellow.	R Green.
2	23	10
3	27	9
4	26	9
5	374	129
6	11	9
7	134	37
8	57	17
9	205	50
10	284	110
11	84	31
12	71	26
13	14	8
Total	1,310	445
Actual ratio	2·9 D	: 1 R
Mendelian ratio	3 D	: 1 R

Out of the 1,755 seeds of the second generation, 1,310 were yellow dominants and 445 green recessives, giving a ratio of 2·9 D : 1 R, which is close to the 3 : 1 expected by Mendel's law. With regard to the precise nature of the dominant and recessive categories in the above experiments, the character of cotyledon colour is apparently much more simple than that of seed shape, possibly being less influenced by the conditions of life.

One hundred full-sized healthy seeds of the yellow *round* Peas were taken at random from Experiments 2, 3, 4, 6, 7, 8, 11, 12, and 13 (those of Experiments 5, 9, and 10 being required for sowing), and when peeled they were all quite indistinguishable in colour from the yellow *round* hybrid Peas of the first generation, both without and within the cotyledons. Similarly, 50 yellow *wrinkled* Peas from the same experiments were indistinguishable both in colour and in shape from the pure yellow *wrinkled* Peas of the 'British Queen' grand-parent. The wrinkled

yellows compared well with Professor Weldon's fig. 5, while the round yellows were a full shade darker. (1902, pl. I.)

In the same way fifty of the green *round* Peas were found to be indistinguishable in colour from the pure green round 'Eclipse' grand-parent, while the green *wrinkled* Peas were a full shade lighter. The wrinkled greens compared well with Professor Weldon's fig. 1, while the round greens were a full shade darker (1902, pl. I.). It is evident therefore that the round Peas, both yellow and green, are throughout the experiment a full shade darker in colour than the corresponding wrinkled ones; and this apparently explains the fact of the dominant hybrids of the first generation being a shade darker than the pure dominant, the former being round while the latter was wrinkled. This suggests that the shade of colour depends upon other factors than heredity, and it would be interesting to know why the wrinkled Peas are a lighter colour than the round ones of similar breeding. Possibly the premature conversion of starch in the wrinkled Peas (if it occurs) may have some effect on the intensity of colour.

In the above experiments the yellow and green colours are perfectly discontinuous, with no trace of the intermediate shades of 'Telephone' and 'Stratagem' shown in Professor Weldon's colour scale (1902, pl. I.).

Combination of Two Characters.

Seed Shape and Cotyledon Colour.

Hitherto we have dealt with seed shape and cotyledon colour in Peas as single characters, but the practical advantages of the Mendelian principles become even more pronounced when we deal with two or more characters in combination in individual plants or races.

In the first generation the Wrinkled yellow 'British Queen' was crossed with the Round green 'Eclipse,' and all the 19 hybrids were of one type, Round yellow.

In the second generation the Mendelian expectation is 4 distinct types, viz.: Round yellow, round green, wrinkled yellow, and wrinkled green, in the respective ratios of 9 : 3 : 3 : 1. All the possible combinations are effected, the frequency being according to the calculus of chance based on the Mendelian ratios of 3 round to 1 wrinkled and 3 yellow to 1 green. On the following page is a list of the actual numbers of each of the 4 types produced by the individual plants in Experiments 2–13.

From the following table it will be observed that each of the expected types occurs in the second generation in accordance with Mendel's law, and that the numbers observed of each type are close to the numbers calculated by means of the Mendelian ratios. The production of these four types in the second generation proves that seed shape and cotyledon colour are two distinct characters, each with a separate and independent inheritance, and that each character must therefore be represented in the germ-cells or gametes by a distinct unit. The appreciation of this elementary fact enabled Mendel to make his discoveries in heredity. All the statistical experiments in the heredity of animals and plants now being carried on by many experimenters in Europe and America are based

upon this simple Mendelian idea of unit-characters (also discovered independently by Professor De Vries before he re-discovered Mendel's long-lost paper, 1900 A, B). Naturally Mendel himself was only able to touch the fringe of the subject in his experiments with Peas; yet, by making this one point clear, he has enabled his many successors to attack the difficult and complicated problem in a new and analytical way. Already, by the application of the Mendelian system of analysis by experiment, there are signs that we are on the eve of some important discoveries in heredity.

Expt.	Round Yellow.	Round Green.	Wrinkled Yellow.	Wrinkled Green.
2	19	8	4	2
3	24	8	3	1
4	17	7	9	2
5	281	97	93	32
6	8	7	3	2
7	109	26	25	11
8	49	13	8	4
9	161	42	44	8
10	203	84	81	26
11	62	23	22	8
12	54	18	17	8
13	10	5	4	3
Observed	997	338	313	107
Calculated	990	330	330	110
Mendelian ratio	9 :	3 :	3 :	1

(Since the above was written, I find that Mr. R. P. Gregory, in a recent paper on "The Seed Characters of *Pisum sativum*" (*New Phytologist*, 1903, December, p. 226, fig. 1), shows clearly that the histological nature of a "Round" Pea is quite distinct from that of a "Wrinkled" one. In a "Round" Pea the starch grains, stored in the cotyledons, are large, few, and oval, while in a "Wrinkled" Pea they are small, numerous, and irregular.

In examining some of the "intermediate" and dubious shapes pointed out by Professor Weldon in such irregular round races as 'Telegraph' (1902, pl. II., figs. 1–4), Mr. Gregory found no seed which, upon histological examination, allowed of any doubt as to its round character.

Mr. Gregory concludes therefore that pitting, false wrinkling, and other irregularities in "Round" Peas must be distinguished from the true wrinkling in "Wrinkled" Peas, and that the latter must be the expression of a distinct physiological process. These important histological observations show the necessity of caution in ascribing irregularities of seed shape in Peas to a failure of Mendelian dominance or segregation; and, as my own experiments show, there is little doubt that some at all events of these irregularities are due to the various influences of the conditions of life, rather than to heredity.)

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EDIBLE FUNGI.

By Dr. M. C. Cooke, M.A., V.M.H.

I think that I may be excused if I introduce this popular subject of "Edible Fungi" in a popular rather than a scientific manner, by ignoring systematic sequence and the classification of text-books, and adhering more to the gastronomic than the botanical aspect of the subject.

Possibly it may appear to some people that the term "Edible Fungi" includes but three, or perhaps four, individuals, viz. the Mushroom, the Morel, the Truffle, and perhaps the Puff-ball; but I think we may soon discover that these are rather to be regarded as the types of so many groups, and not as distinct individualities. The largest of these groups is the first, which represents the Mushroom tribe, as exemplified by the common cultivated Mushroom, a species too well known to require recommendation.

If you will permit me, I will remind you of the principal features which distinguish this group, which the text-books call by the general name of Agarics or *Agaricini*. There is primarily a spawn or mycelium of delicate threads which traverse the soil. From this arises an erect stem, either with or without a ring or collar, and surmounted by a convex cap or pileus. The latter has an under surface of closely-packed radiating plates or gills, which produce and carry the reproductive bodies or spores, which are analogous to the flowers and fruits, or rather to the *seeds*, of more highly-developed plants. So minute are these bodies that we are compelled to resort to the microscope for a revelation of their form and character. The gill-plates are composed of a continuous membrane which is folded in radiating "pleats," and on the surface are found a series of elongated cells, standing side by side, but of two different kinds, one of which is surmounted by four spicules or little spines, at the apex of which each carries a single spore; the other kind is generally rather larger, but without spicules or spores, and consequently sterile, and are called *cystidia*. These latter bodies were by some authors thought to be male organs, whose function was to fertilise the spores. It is better to understand at once that there is no evidence whatever of sexuality, or of any form of fertilisation, in these members of the Mushroom tribe. How it all takes place is still a mystery, and one which seriously affects the cultivation of this class of plants. I may remark, in passing, that it is not difficult in many cases to cause these little spores to germinate artificially in some congenial medium; but, however far this germination may be carried, and it is never very far, in the production of a delicate mycelium, yet all efforts to obtain the most rudimentary Mushroom upon this mycelium have failed, except in the solitary instance of the cultivated Mushroom.

In this connection I may refer to the experiments made by Mr. Worthington Smith on a species of *Coprinus*, which were recorded in the 'Gardeners' Chronicle' for 1875, and seem to prove an exception to the

general rule; but, if so, it has never resulted in practical application. It is commonly asserted that the spores of the Mushroom itself will not germinate thoroughly until they have passed through the intestines of a horse. The grounds for this assertion lie in the fact that only from horsedung can fertile mycelium be obtained. Some years since an American correspondent informed me that he had succeeded in feeding certain insects on Agaric spores, and that these dead insects could be utilised, and would by cultivation produce a crop of the original Agaric, on the spores of which the insects had been fed. I was promised a consignment of these insects, in order to test the assertion, but they never arrived, and I could hear no more of the experiments.

Here, then, lies the difficulty, that with even the most approved and satisfactory of the edible Fungi, there is no known and certain method of cultivation, with the one familiar exception. If the mystery could be solved how, and through what means, the uncultivated Agarics of our woods and pastures reproduce themselves year by year, we might hope to increase our list of edible Fungi amenable to cultivation.

During a life of rather more than an average length I have eaten of no less than eighty species of edible Fungi, and yet I am not addicted to experiment, for all of these were taken upon the faith of someone who had already made the experiment, my own share in the venture being the accurate determination of the species consumed. And yet it is probable that quite half of this number, if not more, were simply capable of being eaten without personal injury, but with nothing better to recommend them. I venture to think that the number of esculent species, found wild in this country, which are really worth the trouble of collecting and eating, are few in comparison with the number which may be eaten without inconvenience, and therefore are classed as edible. And, even with the best, so much depends upon the capacity of the cook that their doom may be sealed in the kitchen.

(1) Foremost in popularity and general utility stands

THE CULTIVATED MUSHROOM: *Agaricus campestris*,

although I may possibly be one of the heretics who consider two or three other species to be equal, if not superior. This species is known and generally appreciated over a great part of the habitable world, though often in its uncultivated form. We hear of it all over Europe, in Siberia, Northern India, Ceylon, Mongolia, North and South America, South Africa, Oceania, Australia, Tasmania: in fact, almost cosmopolitan, wherever the climate will permit it to flourish. It is curious that amongst the native tribes of North-Western India and on the slopes of the Himalayas it is recognised as good for food, and is collected for that purpose. Many species are eaten in China, but whether this is one of them has not yet been definitely ascertained, but it is extremely probable.

(2) Whether the uncultivated form, which is met with in pastures, is superior or inferior in flavour to the cultivated form, is matter of opinion. Some mycophagists are so strongly in favour of the wild Mushroom that they will not eat the latter if the former can be obtained. And here,

again, it must be urged that very few cooks of the ordinary kind can cook Mushrooms properly, so as to retain their delicious aroma and flavour when sent to the table. It may be urged that all Fungi of the Mushroom type are liable to rapid chemical changes, and deteriorate very speedily after being gathered. It is a maxim which should be remembered, that the sooner Mushrooms are cooked after they are gathered the better, and that they are never so good as when firm, fresh, and crisp, almost with the morning dew upon them.

The common Mushroom, *Agaricus campestris*, both in the wild and the cultivated form, is subject to considerable variation. Possibly this variation is more or less stable. That which was classed by Berkeley as a variety, under the name of *pratensis*, has been found in two localities in Britain, if not more. It is distinguished by the small rufous scales of the pileus, and the flesh has a slight pinkish tinge. It is known also in Italy, where it has been recognised and described as a distinct species, under the name of *Agaricus pratensis* (Vittadini), but I have never seen it. Hence it is too rare to be of much interest to us, except as a curiosity.

(3) Another variety has been called *silvicola*, also a native of Italy, and there regarded as a distinct species under the name of *Agaricus silvicola* (Vitt.); it is occasionally found in this country in woods. It has a smooth shining pileus of a creamy white, and soft, like a kid glove. The stem is longer than is usual in the pasture Mushroom and swollen at the base. It has a similar flavour to the Mushroom, as I have proved by experiment, and certainly is quite a distinct variety, if not entitled to rank as a species. It is nevertheless too rarely met with to be depended upon as an esculent. It is of interest, whether as a variety or as a species, from its woodland habit, the typical Mushroom being confined to the "open."

Berkeley also figured and described a peculiar variety to which he has given no name, which has a rufous pileus, and the flesh turns a bright red when cut or bruised. The gills are at first white, and not pink, finally becoming dark brown. Single specimens are now and then to be met with; but, if I am not mistaken, it is not to be recommended as an esculent, as I have proven that a single small specimen may disagree with the stomach, which is not only my own experience but also that of some of my friends.

(4) I need only refer to one other which has been called a variety of *Agaricus campestris* under the name of *villaticus*, known in France, and described there as *Agaricus villaticus* (Brondeau). I venture to think it entitled to rank as a species. I have received it and eaten it two or three times with great pleasure. It is a large species, in each case fully nine inches in diameter of the pileus, which is about as scaly as the cultivated Mushroom, with a thick firm flesh and a pleasant odour. Once it was sent to the Scientific Committee and was collected in a coal-cellar. At another time I had specimens which were found growing out of the wall in a coal-cellar near Tottenham Court Road. In all the cases in my experience they were found in a coal-cellar. Unfortunately, in this instance also it is found but rarely, or if found is never recorded.

(5) *Agaricus elvensis* (Berkeley). It is now many years ago since the Rev. M. J. Berkeley discovered and named an Agaric as *Agaricus elvensis*,

which had some of the features of the cultivated Mushroom, and yet others which pronounced it to be quite distinct. This was certainly upwards of thirty years ago, and nothing was heard of it again for many years. Ultimately a friend of mine, who was much interested in edible Fungi, found some large Agarics growing under the drip of Oaks near the Neasden reservoir, and immediately summoned me to report upon them, which we did by cooking them for supper, as they proved to be *Agaricus elvensis*, and our unanimous verdict was that they were the most delicious Mushrooms we ever tasted.

Afterwards, in the same season and in successive seasons, we visited the same spot and collected the same species. It was some two or three years after these events that I discovered, in early autumn, under the drip of a Pear tree in my garden in Upper Holloway, some tufts of Mushrooms which were breaking through the soil. These were watched day after day with great interest until mature, when they were identified as *Agaricus elvensis*, the Mushroom of Neasden reservoir, and the successive crop supplied our table for weeks.

The immediate question which suggested itself was, how came this Agaric into my garden in a London suburb, when it had previously been only known at first in the Midlands and afterwards at Neasden? The only solution I could suggest was that I must have thrown some portions of the Neasden specimens into the garden, as I always did of all edible species which I collected, in the hope that some one of them might some day naturalise itself. This was the only key I could suggest to the mystery, for the same species came up in the same spot for three or four years, but diminishing yearly in size and number until they entirely disappeared. Supposing this to be the true solution, it appears to me to suggest strongly that this species, if taken in hand, might possibly be brought under cultivation.

Now I must be permitted to describe in a few words the salient features of this new species:

(*a*) It was distinctly and decidedly cæspitose, so that six or eight individuals were developed in each clump or tuft, some two or three arriving at maturity at the same time, others succeeding and expanding in the course of two or three days.

(*b*) Each pileus, when fully grown and expanded, would reach from six to eight inches in diameter, and the flesh of the pileus at the centre in full-grown specimens quite an inch in thickness, firm, turning slightly brown when cut or broken.

(*c*) The whole surface of the pileus clad with dark brown pointed scales, which stood out like conical warts at the margin; the whole fungus, including the thick solid stem, of a brownish colour.

Anyone comparing this description with his recollection of *Agaricus campestris* will at once concede that it is something quite different, and must, if species go for anything, be regarded as distinct.

It may be added that it has been found somewhat recently in France, and I have seen remarkably characteristic drawings of French specimens.

(6) Horse Mushroom : *Agaricus arvensis* (Schæff.).

The Horse Mushroom, as it is often called, attains a large size, say from six to ten inches in diameter, and differs from the ordinary Mushroom in the smooth white pileus, and the gills, at first of a dirty white. It is usually plentiful enough during the season at the shops of greengrocers in all parts of London and suburbs. Found growing in meadows, it is usually gregarious, and often forming rings or parts of rings of a considerable size. Opinions are divided as to its value as an esculent. Some call it coarse and strong and too full flavoured, whilst others, and not a few, prefer it to the cultivated Mushroom. In country districts it is collected chiefly for making ketchup, for which purpose it is acknowledged to be superior to the common Mushroom. Amongst the adult peasantry it is scarcely probable that any mistake is ever made in confounding either the one or the other with unsavoury species. When cases of poisoning occur the victims are most commonly children, or adults who have not been accustomed to a country life. The mycelium seems to be perennial, since it may often be gathered year after year from the same spot where it has once been found in profusion. This species also is widely distributed, not only throughout Europe, but also in Ceylon and Tasmania.

(7) Bleeding Mushroom : *Agaricus hæmorrhoidarius* (Schulz).

Another species of the true Mushroom kind ; it is one which is rarely found, by roadsides, in woods, or under Oaks. The cap is often four or five inches in diameter, and of a dirty clay colour, scarcely to be distinguished from the soil on which it grows. This is clad with broad and closely-pressed scales, and is not at all an attractive species in appearance. The gills are at first of a rosy flesh-colour, becoming of a deep purplish-brown. All parts of the plant turn red, as if bleeding, wherever bruised or wounded, and by this feature it may be easily recognised. It was first discovered, some years ago, in Hungary, and I have gathered it occasionally in this country and found it to be excellent eating, and not to be distinguished when cooked from a good Mushroom. It seems to be sparingly distributed through Europe, but has not been recorded elsewhere.

There are some few other species in this group that are occasionally met with, but, on account of their rarity, it is scarcely necessary to enumerate them, except as mycological curiosities.

(8) St. George's Mushroom : *Tricholoma gambosa* (Fries).

The colour of the spores is a feature which should always be borne in mind in discriminating the species of Agarics, and as hitherto we have been concerned with purple-spored forms, so now we have to deal with species having white or colourless spores. One of the most useful of these, in a gastronomic sense, is the May Mushroom or St. George's Mushroom, so called because it makes its appearance in meadows about the time of St. George's day. In size and habit it resembles the uncultivated Mushroom, but the top of the cap is smooth, the gills are

white, the stem has no ring or collar, and the odour is distinctly strong. Moreover, it has a habit of growing either in rings or parts of rings, in which feature it bears a resemblance to the Horse Mushroom. As an esculent this species is welcome, since it flourishes at a period of the year when very few edible Agarics are to be found, and it possesses somewhat the flavour of the true Mushroom, for which it is an excellent substitute.

(9) Blewits : *Tricholoma personata* (Fries).

Another very useful white-spored Agaric is that which is known in the Midlands and elsewhere as Blewits ; under which name it is offered for sale in the Nottingham market, and is highly appreciated by the natives. In habit and size it resembles the St. George's Mushroom, though not a spring but an autumnal species, and there is commonly a violet-blue colour about the stem and sometimes the gills, from whence its name is derived. It has not the strong odour of the St. George's Mushroom, is somewhat milder in flavour, and does not assume a more or less annular mode of growth. There is sometimes a tinge of lilac also on the dusky pileus or cap. It is found growing principally in pastures, but appears to be somewhat local in its distribution, since we have never seen it growing in Essex or Middlesex, but have known it collected and served at hotel dinners in Kent.

(10) Blue Caps : *Tricholoma nuda* (Bulliard).

Scarcely inferior to the Blewits or St. George's Mushroom is the 'Blue Caps,' which are often to be gathered in quantity amongst dead leaves in woods and sometimes on rubbish heaps, since it is gregarious in its habits. When young it is wholly of a delicate violet-blue, but with age the pileus often becomes ruddy and the stem mealy. It is usually three or four inches in diameter, but sometimes five or six inches ; somewhat like the Mushroom in form and proportions, but the cap soon becomes depressed and concave, quite smooth and dry. The gills are of the same colour as the cap, and the spores are white.

As an esculent it is tender and mild, with less flavour than the Mushroom or even the St. George's, but still pleasant and digestible, although some fungus-eaters consider it rather indigestible, but that probably is more the fault of the liver of the consumer than of the fungus itself. Those who are acquainted with it never lose a chance of eating it, and it has the merit of being so characteristic that when once known there is no chance of confounding it with anything else. It may be cooked in any way of which the Mushroom is capable, and may be found in the late summer or early autumn. Like most of its kind, it is preferable when young, and before the pileus assumes its ruddy tinge.

(11) Dusky Caps : *Clitocybe nebularis* (Batsch).

Similar in firmness of flesh, and in flavour and edible value, to the immediately foregoing is the 'Dusky Caps,' which attains a considerable

size and is gregarious in its habits. This also is an autumnal species and is always found amongst dead leaves. Sometimes it may be gathered as late as the beginning of December. The cap is sometimes only three or four inches in diameter, but often five or six, soon becoming flattened and concave, and often, when old, almost funnel-shaped. The usual colour is cloudy grey, rather darker in the centre, with a sort of glaucous bloom on the caps, like the "bloom" of a plum. The flesh is very thick and firm at the centre, and the stem long and thick, dirty white, striate, and somewhat thickened downwards. The gills are narrowed behind and run a little down the stem, very close together, and creamy white. The odour is rather strong, and some fancy it cheesy, but when raw the taste is mild. There is a great difference of opinion amongst Continental authors as to its edible qualities, many of them regarding it with suspicion, but we have eaten it so often that we have no doubt as to its qualities, although perhaps not quite so digestible as some. There is nothing very prepossessing in its appearance, and the 'Blue Caps,' which often grow in company with it, would always be accepted in preference.

(12) Parasol Mushroom: *Lepiota procera* (Scopoli).

Another favourite Fungus with mycophagists is the handsome white-spored species known here and on the Continent as the Parasol Mushroom. The cap or pileus is usually 3 or 4, but sometimes 7 or 8, inches in diameter, with a prominent central boss or umbo of a brown colour, the ground-colour of the cap being dirty white, with its thick cuticle torn up into broad scales, leaving the exposed portions silky, especially at the margin. The substance is rather thick towards the centre, but soft, almost spongy. The gills are white and broad at the base, not reaching to the stem, but leaving a channel round it. The stem is tall and erect, from 8 to 12 inches long, but scarcely more than half an inch thick except at the base, where it is swollen in the form of a bulb. The lower part of the stem is delicately variegated with small closely-pressed scales. The ring around the stem is large and spreading, so slightly attached that it soon becomes movable. Both taste and smell in the raw state are pleasant; the general appearance suggests the name of Parasol Mushroom. It is milder in flavour and more delicate when cooked than the common Mushroom, and is of a drier consistency, so that it does not decay so rapidly, but in dry seasons will become quite dried whilst still on the ground.

(13) Maned Inky Mushroom: *Coprinus comatus* (Fries).

There are very few of the black-spored Agarics which are fit for food, but one of these has a great reputation, and some persons consider it quite equal as an esculent to the choicest Mushroom. It is called a *Coprinus*, and differs from the ordinary Agarics in the rapid deliquescence of the gills, which, when mature, soon drop away in an inky fluid which may be used as a substitute for ink, and has been seriously recommended for printing bank-notes, since the large black spores are readily detected under the microscope, and forgery would be impossible so long as the secret was unknown (fig. 155).

This fungus comes up freely in waste places, on building plots, by roadsides, &c., and mostly in clumps or clusters. Whether grilled or stewed, the flavour can scarcely be distinguished from that of the ordinary

FIG. 155.—COPRINUS COMATUS. (*Gardeners' Chronicle.*)

Mushroom, but it should be cooked almost as soon as it is gathered. One characteristic is not found in any other esculent species, that it may be collected amongst bricks and mortar. We have often taken a basket and collected sufficient for the breakfast of a family from waste ground on which the builders were at work, so that it may be called the fungus of civilisation, or even recognised as the mark of the jerry builder's foot.

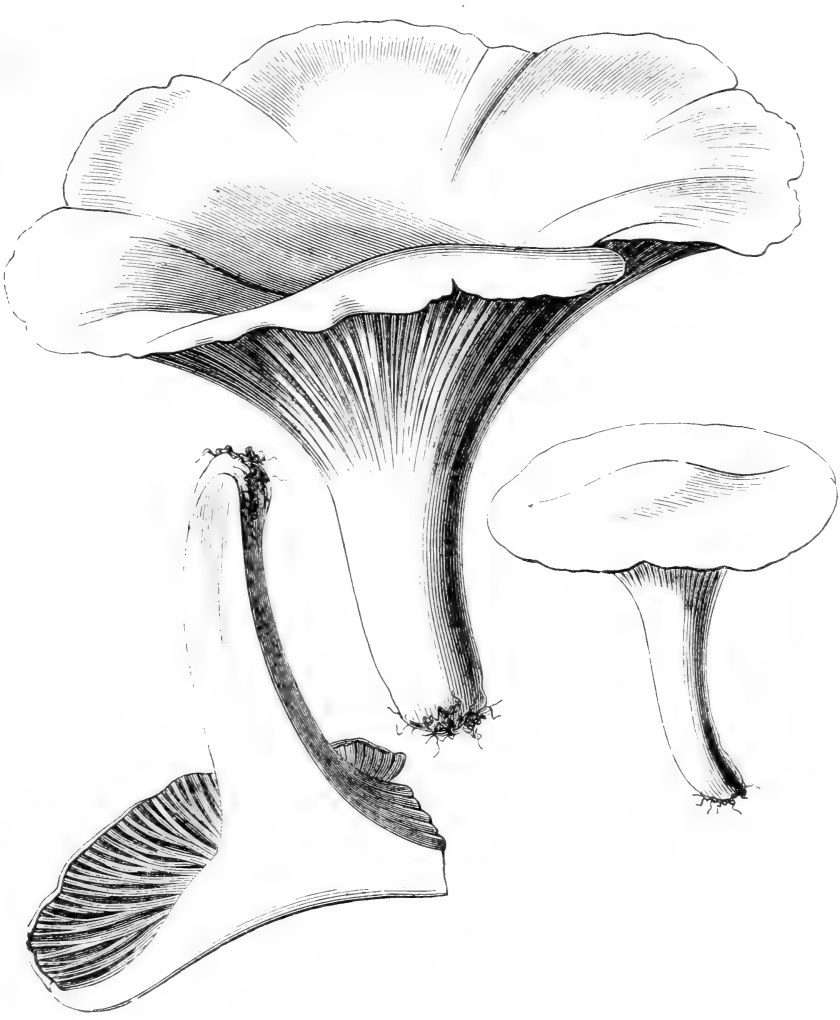


Fig. 156.—Cantharellus cibarius. (*Gardeners' Chronicle.*)

(14) Chantarelle: *Cantharellus cibarius* (Fries).

This brilliant golden yellow fungus has been praised, as we think, far beyond its merits, since we never regarded it as a favourite. Nevertheless we have authority for stating that in former times it has been served at dinners on state occasions, and an old writer has declared that it would arrest the pangs of death. It is rather a small species, usually not

exceeding two inches in diameter, and wholly of a bright golden-yellow colour, expanding upwards gradually so as to be almost obconical, with the gills running down the stem. In this instance the gills are not like plates, but rather resemble thick veins. The top of the pileus or cap is depressed, and the obtuse margin is lobed. The whole fungus is firm, almost leathery, and dry, with a strong odour—some say of ripe Apricots, and others of Plums. It is found in woods, and certainly is plentiful about September or October in some parts of the New Forest, but in most seasons a few will be found in Epping Forest or in most woods.

It is eaten regularly in France, Germany, Austria and Italy, where it is exposed in the markets for sale, but nowhere does it seem to be a great favourite with the poorer classes. More than any other species does this depend upon good cooking to illustrate its virtues (fig. 156).

Fig. 157.—Marasmius oreades. (*Gardeners' Chronicle.*)

(15) Fairy Ring Champignon: *Marasmius oreades* (Fries).

This little fungus has a great reputation at home and abroad, although not as a rival to the common Mushroom nor as an exclusive maker of

fairy rings; but that subject must not detain us to-day. The Champignon—and, by the by, all Agarics are Champignons in France—is a small, dry-looking Mushroom, seldom more than an inch in diameter, of a warm buff colour, with a tall slender white stem, not thicker than the stem of a clay pipe. The cap is convex at first, soon becoming flattened, quite smooth, without lines or scales, and the gills are broad, rather distant apart, and either quite white or creamy white, reaching to the stem. The substance is tough and elastic, not brittle, and drying readily without melting or becoming soft. After being dried, if placed in water, it absorbs the moisture and soon acquires its original shape. It is common in pastures, on lawns, and by the roadside, but not in woods. It makes its appearance in summer, but in September and October, when others are plentiful, this is seldom to be seen (fig. 157).

This little fungus is useful, but not as a breakfast delicacy, and when dried it may be kept for use during the winter as an ingredient in stews and for general flavouring purposes, for which purpose it probably has no equal, although not much in use in this country. Known and appreciated throughout Europe and North America, Siberia, and the island of Borneo.

(16) Edible Boletus: *Boletus edulis* (Bulliard).

There is another group of Fungi, Mushrooms we may call them by courtesy, which possess the external form and appearance of Agarics, though the under surface of the cap or pileus is not furnished with radiating plates or gills, but instead thereof a mass of long slender tubes, which are packed closely side by side and agglutinated together, presenting open ends to the surface, like pin-holes pricked in the substance. These tubes contain the spores which are generated from the sides, as in the Agarics they are produced from the gills, and when mature are expelled from the pores. The genus with which we are concerned in this group is called *Boletus*, and the most important species is *Boletus edulis*.

This species is common in woods, but is not appreciated as an esculent in this country, on account of its sliminess, which would be a recommendation to the Chinese.

The cap reaches from four to six or eight inches in diameter, quite convex, of a warm brown colour, not unlike a "penny bun," smooth, but slightly moist or viscid. The under surface, or pore surface, is of a light greenish yellow. The stem is robust and solid, an inch or more thick at the top, and twice as thick below, colour of warm ochre, with a minute reticulation or network of fine veins at the apex. The taste of the flesh, when fresh, is sweet and nutty. When cooked, the mass of tubes should be cut out and excluded.

In Germany, Austria, and some other Continental countries every little provision shop has "ceps" for sale all the year round. These are slices of the pileus of *Boletus* dried in the air or the sun, and sold at a small price per pound, even in the "Delicatessen" shops in the neighbourhood of Soho. They are used as an addition to soups and "made dishes." Dried ceps are made into soup in some parts of Europe; the

slices are soaked in warm water until they become softened, and then stewed with condiments and eaten with toasted bread. Berkeley wrote that, "though much neglected in this country, it appears to be a most valuable article of food. It resembles much in taste the common Mushroom, and is quite as delicate."

(17) Rough-legged Boletus: *Boletus scaber* (Fries).

Another *Boletus* equally common in woods does not attain quite the same size, but with a longer stem, thick at the base and gradually attenuated upwards, of a dirty white colour, and rough throughout its length, with blackish dot-like scales. The colour of the pileus is usually a dull brown, or sometimes terra-cotta red, and the pore surface is very convex, dirty white, with a deep channel round the upper portion of the stem. When cut, the flesh of the cap and stem usually turns of a reddish-grey colour.

Its qualities and uses are much the same as those of the edible *Boletus*, for which it may be employed as a substitute.

(18) Morels: *Morchella* sp.

Morels are certainly not so much esteemed in this country as on the Continent. In the spring one sees them constantly exposed for sale in Paris in a fresh condition, and I have heard of their being seen in Covent Garden Market, but never seen them myself. The fungus, dried whole, may be purchased, at so much a pound, for flavouring soups, but it is preferable in the fresh condition, at a time of the year when Mushrooms are scarce or absent. They are even sold in strings in the bazaars of N.W. India, and two or three species are collected for this purpose in the Vale of Cashmere. We have five or six indigenous species, and one very large one, enough for a meal for two or three people, of which we have seen fine specimens kicked about in a country lane by lively boys who did not know their value. The Morel is not an Agaric but an almost pear-shaped substance, covered with deep hexagonal pits. These pits contain the spores, which are not naked, as in the Agarics, but enclosed in long cylindrical sacs or asci of thin membrane, and are closely packed side by side, each sac enclosing eight spores, which are ejected from the apex when mature. No method has yet been devised for cultivating the Morel, although wherever esteemed it maintains a good price.

Common Morel: *Morchella esculenta* (Persoon).

The common Morel is the one most usually found, but it is inconspicuous, and requires hunting for. The head is almost globose, about two inches in diameter, and has its base growing to the stem; the entire substance is hollow. It is found from April to June on chalky or clayey soil. This is the species commonly seen in Paris.

FREE-CAP MOREL: *Morchella semilibera* (Persoon).

This is a smaller species, with a longer stem and a conical cap, free from the stem at its base, so as to be more like a pointed cap or hood. It is equally good, and is found at the same period of the year, but with us is not so common.

SMITH'S MOREL: *Morchella Smithiana* (Cooke).

This is the largest species, and apparently has only been found hitherto in this country. It attains as much as a foot in height and seven inches in diameter. The cap or head is nearly globose, of a warm tawny colour, sculptured with large deep pits. It need hardly be added that it forms a most delicious article of food.

Other British species need not to be enumerated, as they are comparatively rare.

(19) MOREL SUBSTITUTES.

We possess in our native woods two or three excellent substitutes for the Morel, both in flavour and facility for preservation, which might well be commended if they could be obtained in any quantity. Unfortunately the species of *Helvella*, to which we allude, are scattered in numbers, and only two or three specimens will perhaps be met with during a stroll in the woods. They have this advantage, however, that they can always be gathered and hung up to dry, and thus preserved for winter use. In flavour they are hardly to be distinguished from the Morel, and they are autumnal species, whereas all the Morels are vernal. The dark grey *Helvella* (*H. lacunosa*) seems to be more gregarious in its habits than the white *Helvella* (*H. crispa*), although perhaps not quite so delicate. Of this species we have in some years collected fully fifty specimens during an afternoon stroll in Monk's Wood, Epping Forest, within an area of a few score yards, but the white kind is rarely met with except in single specimens (fig. 158).

(20) GREAT PUFFBALL: *Lycoperdon bovista* (Linnæus).

No enumeration of the best and most popular of edible Fungi could be complete without the addition of the Puffball, and yet it is nothing like the Mushroom either in form, structure, or flavour, but in all these features it is a phenomenon by itself. As to form it is almost globose, often as large as a man's head and sometimes larger; but, although we have seen them a foot in diameter, never so large as a recumbent sheep as reported from North America. The surface is of a creamy whiteness when fresh, and smooth and soft as a kid glove. In structure it has no gills or pores, but the whole interior is a spore-bearing mass. In the edible condition, when cut through, it is wholly of the same colour as externally, moist, juicy, and firm, so that it may be sliced like a Turnip. After a time it becomes yellowish, then greenish, and at last snuffy brown,

when it is no longer moist but powdery, and consists of a mass of minute spores intermixed with thin delicate threads. In this condition it was in olden times employed in rural districts as tinder, as a styptic for staunching wounds, and was burnt to suffocate bees. It need scarcely be said that when used as an esculent it must be in its young and creamy condition, before it acquires a tinge of yellow or green.

It grows on the borders of fields, in orchards, and occasionally in gardens, sometimes singly, and sometimes two or three together.

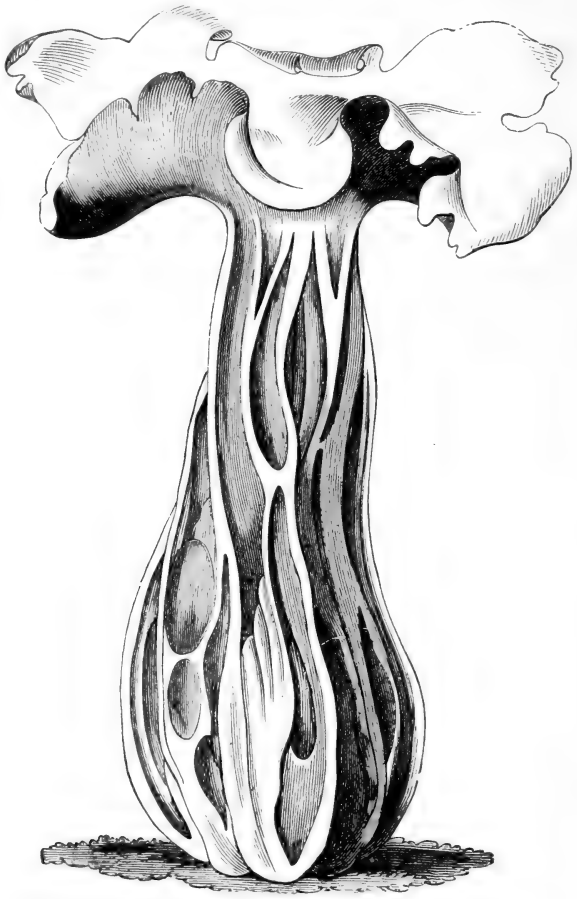


Fig. 158.—Helvella crispa. (*Gardeners' Chronicle.*)

As to its qualities for the table, all who have tried it have been converted in its favour. Cut in thin slices about a quarter or third of an inch thick, it should be smeared with egg, sprinkled with bread-crumbs, and fried in butter, with pepper and salt and sweet herbs, if the latter are preferred, and served hot like fritters or pancakes. It cannot be compared with Mushrooms in any way, it cannot be treated the same, and it has no resemblance in flavour, but is an entirely new sensation. Dr. Curtis says that "it has a delicacy of flavour that makes it superior to any omelette I have ever eaten." Other encomiums have been passed upon it, but,

singularly enough, we have never heard of anyone who has been induced to taste of it and remained insensible to its good qualities. As a variety it may be treated as a sweet omelette, and the salt and pepper replaced by jam or preserve.

The smaller Puffballs, of which there are several species, are some of them capable of similar treatment, but they are so small that we have never thought them worthy of a trial. For a sensation in fungus-eating we can recommend nothing equal to the giant Puffball.

(21) Truffles: *Tuber* sp.

We have barely time to allude to Truffles as edible Fungi, but Truffle-hunting in Kent and Sussex is now almost a lost art, and most of the Truffles used in this country are imported. Two, or perhaps three, edible species have been found in this country, but the original species was called *Tuber æstivum* (Vittadini). The French Truffle is *Tuber melanosporum* (Vittadini).

Truffle culture is often written about, but it is very difficult to arrive at sound conclusions. It is in fact an indirect culture by the planting of trees which are favourable to Truffle production. These are Oak, Hornbeam, and perhaps Chestnut and Hazel. The planting of pieces or parings of Truffles in naked soil has not proved successful. Doubtless we may conclude that the methods of genuine Truffle culture have yet to be discovered.

It would have been possible to enumerate five times as many species which may be eaten without inconvenience, but I considered it more advisable to confine our observations to the best and the most to be recommended, even although few in number. Probably some of those excluded were well worthy of notice had they been more common or more readily obtainable; and some even which are available have been omitted as of secondary importance.

Before concluding I must be permitted to urge that in judging edible Fungi we must not accept the ordinary Mushroom as the sole type of flavour to which all other species can be compared, for this is not the fact, as there are good esculent species which have a flavour and aroma peculiarly their own, and must be appreciated on their own merits. Besides, there are some which are excellent for one purpose and not suitable for another, and yet all may be invaluable for kitchen purposes. Our first duty is to remove a strong prejudice and suspicion, that must be admitted, in favour of one species, and one species alone, which has remained supreme master of the British breakfast-table for centuries, to the exclusion of all rivals.

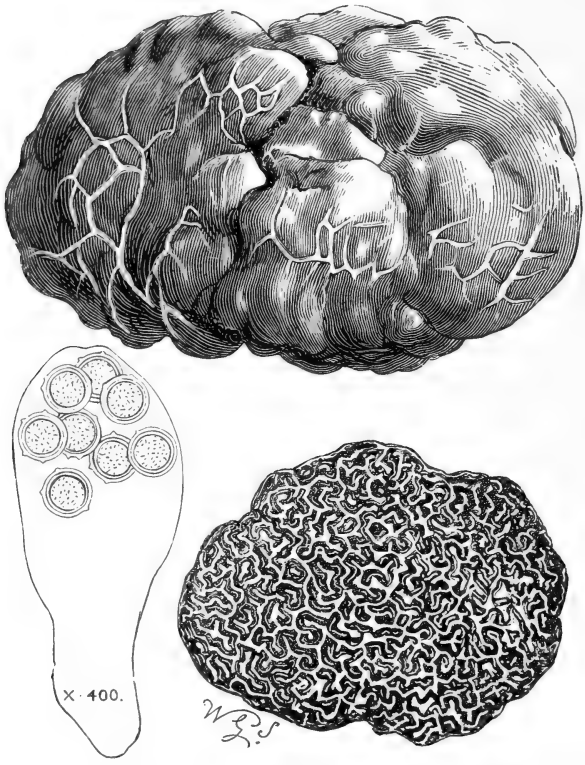


FIG. 159.—CHOIROMYCES MEANDRIFORMIS. (*Journal of Horticulture.*)

Choiromyces meandriformis (fig. 159) has not been included amongst edible Fungi as Dr. Cooke has never known it eaten in this country. It is a British subterranean species growing as big as a man's fist, but is not a true Truffle but a pseudo-truffle. It is supposed to be identical with the *Tuber album* of Sowerby's Fungi. Bulliard has figured a *Tuber album*, but it is not certain whether it is the same species, because of the absence of details of the fructification.

The *Tuber album* of the Continent is supposed to be that of Bulliard, which is included in Roque's Champignons, but he does not say a word as to whether it is edible or not.

Choiromyces is said to have such an abominable odour that most people would be deterred by that alone from eating it.

ABSTRACTS OF FOUR LECTURES TO STUDENTS, AT CHISWICK, 1903.

By Rev. Prof. G. Henslow, M.A., F.R.H.S., V.M.H.

I. Arrangement and Stipulation.

Arrangement.—Leaves are arranged in two ways on a shoot; either singly at a joint or node, when they are said to be *alternate* in position; or else two or more stand at the same node. When this is the case they are *opposite*, if two, or *whorled*, if more than two; and the rule is that each pair, or more than two if whorled, alternate in position with the pair or whorl above and below.

There is great variety of arrangements among alternate leaves, and they may be represented as follows:

If any leaf on a shoot be called No. 1, and the next No. 2, and if this stand on the opposite side of the stem, then the third leaf, or No. 3, will be exactly over No. 1. A line drawn on the stem from No. 1, through No. 2, to No. 3, would coil spirally *once* round the stem. It would form a circle if compressed like a watch-spring, instead of being like one turn of a screw.

Sometimes the fourth, sixth, or ninth leaf falls over the first. In the last two cases the spiral line makes *two* coils.

A simple way to represent these different arrangements is to let the number of leaves 2, 3, 5, 8—that is, from No. 1 to the next leaf exactly over it, but not including it—be denominators of fractions, the numerators being the number of coils on the spiral line.

Hence the four kinds mentioned would be represented as follows:

$$\tfrac{1}{2},\ \tfrac{1}{3},\ \tfrac{2}{5},\ \tfrac{3}{8}$$

Each of these denominators is said to make one "cycle"; the third, fourth, sixth, and ninth leaves over the first, respectively, begin the next cycles.

It will be at once observed that the sum of any two successive numbers makes the next numerator and denominator respectively; so that we might continue the series thus:

$$\tfrac{5}{13},\ \tfrac{8}{21},\ \tfrac{13}{34},\ \&c.$$

The first four are the commonest when leaves are not crowded, but when the "internodes" between them are very short, then the arrangement of the leaves (or what may represent them, as the bracts of the involucres of Composites, or the scales of cones), will be found to be represented by the higher fractions $\tfrac{5}{13}$, $\tfrac{8}{21}$, $\tfrac{13}{34}$, &c.

The question may soon be asked, What is the meaning, or use to the plant, of these different arrangements? The answer is, that the leaves may present as much as possible of their upper surfaces to the light; so that when they are crowded, it may be not until we get to the fourteenth, twenty-second, or thirty-fifth leaf that each falls almost exactly over the first.

A plant has the power to change its normal arrangement on the same plant, on its different shoots, according to their position. Thus the

horizontally growing boughs of the Elm, Ivy, or Laurel will be seen to have their leaves in two ranks, so as to expose their surfaces to light from above, *i.e.* they are represented by $\frac{1}{2}$. But if shoots of the Laurel, for example, grow vertically upwards out of the summit of the bush, the leaves will be found arranged all round the shoot according to the $\frac{2}{5}$ plan.

Sometimes this $\frac{1}{2}$ arrangement is only *imitated*, as by the Yew. Young shoots—or all of them in the Irish Yew—stand erect, the leaves being scattered all round them according to the $\frac{2}{5}$ plan; on the horizontal shoots the leaves stand in two ranks, but only in consequence of a twist at the base of the little footstalk.

The next question is, what is the origin of these two systems, "opposite" and "alternate"? As the two cotyledons of all dicotyledons are opposite in position, they suggest that "opposition" in leaves was the primitive condition, and that alternate arrangements are later and derived.

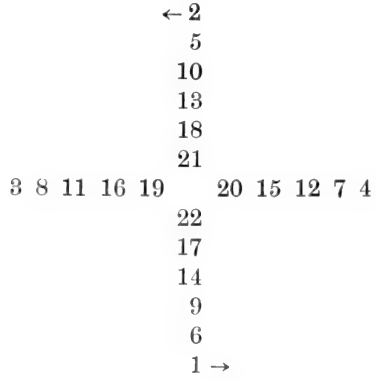
Numerous changes can be well studied among the stems of the Jerusalem Artichoke. It often happens that opposite pairs of leaves below, and alternate ones above, can be found on one and the same stem. The change can be there readily observed. The two leaves of a pair will be slightly separated in height. Then, those of the next pair a little more so. At the same time a slight tendency to shift the position of the leaves round the stem will be noticed. The third pair will thus have not only a large internode between their two leaves, but be much less in an "opposite" position.

After a time, enough spaces between the leaves of each pair will be present to establish them as "alternate," but after some irregularities the sixth leaf finds itself over the leaf which may now be selected as No. 1.

An important fact must now be noticed. Suppose, on holding the stem erect, the pair of lower leaves will be standing right and left of the observer; then, if it be the right-hand leaf of a pair which is a little raised above the common level of the two, it will *always* be the right-hand one which rises above its companion, i.e. *on rotating the stem.* Hence a *continual spiral line* can be drawn through the now separated leaves.

The following diagram will explain this, where 1, 2; 3, 4; 5, 6; &c., stand for the original pairs of leaves, each pair standing at right angles to the pairs above and below. The numbers show the order of "uplifting."

The *horizontal shifting* is suppressed to make matters clearer.



The reader will here observe that 1, 6, 9, 14, 17, 22 fall over each other, corresponding to the cycles 1 to 5, 1 to 8, 1 to 13, 1 to 16 (=2×8) 1 to 21, and represented by the fractions $\frac{1}{2}$, $\frac{2}{5}$, $\frac{3}{8}$, $\frac{5}{13}$, $\frac{8}{21}$. $\frac{1}{3}$ is not represented.

Besides changes from opposite pairs of leaves into the above alternate arrangements, others sometimes appear arising from whorls of *threes* on stems of the Jerusalem Artichoke. These give rise to alternate leaves representable by $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{7}$, $\frac{3}{11}$, &c.

Enough has now been said to show how leaf-arrangements occur in nature. There remains one more application, and that is to flowers ; for all the parts of flowers are really foliar organs.

It has long been noticed that *fives* are peculiarly common in the whorls of flowers of Dicotyledons and *threes* in those of Monocotyledons. They are really cycles of the $\frac{2}{5}$ and $\frac{1}{3}$ arrangements respectively, the former deducible from opposite cotyledons and the latter from a single one.

Where petals, stamens, or carpels are very numerous, as are also the florets of a head of any composite, there it has been found, on counting the numbers of hundreds, sometimes thousands of examples, that certain numbers form *maxima*. Then these correspond with cycles. Thus the Corn Marigolds had 13, 21, and 34 as the prevailing numbers of ray-florets. In Primroses 8 and 13 prevailed, as well as the normal number 5.

Why Nature should prefer, so to say, "cycular numbers" for whorls, as "dominant," over other, when the whole series of petals &c. forms a continuous spiral, is not at all obvious, but so it seems to be.

It has been found, too, that 13 is a maximum of the stigmatic rays of Poppies, and such are more fertile, a curious but inexplicable coincidence.

Stipules.—These consist of a pair of appendages arising from the stem, one on either side of the base of a leaf, or they may be adherent to the petiole itself, as on a Rose-leaf.

They assume various forms and have various functions, or they may be rudimentary and functionless, or even absent, their former presence being only detected by the internal anatomy.

A common use is to protect the bud in the axil of a leaf, as in the Garden Pea, and *Lathyrus Aphaca*, &c., in which plants they are large and green or foliaceous, and so form additional assimilative uses to that of the blades. They thus compensate for the loss of leaflets which are now represented as tendrils.

In *Galium* and Woodruff the stipules are exactly like the leaves, and are sometimes increased in number beyond the usual four, at the node, *i.e.* two for each of the pair of opposite leaves.

The members of the tribe *Stellatæ* of the order *Rubiaceæ* (to which Galiums, Madder, Woodruff, &c., belong ; the tribe being so called because the leaves and stipules are whorled or "star-like") supply a convenient way of examining the true connection between leaves and stipules.

If a thin section be made by cutting a stem across just above and just below the whorl, thin enough to be translucent, the circle of woody fibres with cellular tissue or pith in the middle will be readily seen. Two fibres or cords pass out on opposite sides, or ends of a diameter, one

entering each of the two leaves. Then a zone or girdle will be also noticed passing from one leaf to the other, *outside* the stem-cylinder.

This is called the stipular zone or arcs. It is *from this* that the cords are supplied to the leaf-like stipules. As this zone can supply any number of cords, so the number of stipules is often increased.

If leaves arise singly from the stem—*i.e.* are "alternate"—then as a rule three cords issue from the cylinder to enter it. One is immediately below the position of the leaf, and two others arise from a certain distance, passing round and entering the sides of the leaf-stalk. It is these lateral cords from which the stipular cords always arise, and never from the stem-cylinder itself. Hence the anatomy shows that stipules are really part of the leaf, and not independent stem-structures.*

Besides protecting the bud in the axil of a leaf, stipules may take on the form of bud-scales, and so protect the winter-buds of trees of many kinds. In these the leaf to which any two may belong is not formed. This is the case with the Elm, Oak, Beech, Sweet Chestnut, and Lime.

The stipules form oval brown scales, overlapping one another. As the bud expands in spring-time they soon fall off, having performed their duty as a protection during the winter.

In many herbs, especially of hot dry regions, as deserts, the stipules are colourless, and so completely hide the green foliage that the plant looks white or grey. The use in these cases appears to be to reflect the heat and light, so as to protect the more delicate parts concealed from injury by scorching or radiation.

A remarkable Begonia (*B. venosa*) and species of *Polycarpæa* and *Paronychia* are thus provided with "scarious" stipules. Stipules sometimes take the form of tendrils. Such is the case with the Bryony. In this plant the distribution of the cords of the stem is scattered and not in a regular cylinder, being much like those of a monocotyledon. When this is the case transverse cords are thrown out from one to another, making a sort of horizontal plexus. It is from this that the bud and tendril arise.

In *Smilax*, a monocotyledon, the tendrils arise with cords from the petiole itself.

In some plants, as *Paliurus australis*, the stipules form strong hooks for scrambling, if not climbing purposes, like the hooked thorns of Roses and Brambles.

In Acacias the stipules form sharp thorns, sometimes of a gigantic size. *A. horrida* of South Africa thus forms one of the so-called 'Wait-a-bit' thorny plants, being used for hedges, &c.

The Bull's-horn Thorn of Nicaragua is remarkable for having its stipules occupied by ants. On the petiole is a large honey-gland, and each of the leaflets develops a pear-shaped little body which supplies them with food. In return for "board and lodging" the ants protect the tree from other species known as "leaf-cutters." These strip shrubs of their leaves, which are cut into fragments and, in Mr. Belt's † opinion, used as hotbeds for growing edible fungi underground. Others think it is only

* Apparent exceptions arise from great degradation, as in Violets and Dog's Mercury, &c.

† *Naturalist in Nicaragua*, p. 219. This is now proved correct by Alf. Möller.

for heat by fermentation for the eggs. Stipules not infrequently secrete honey as well as other parts of plants, rendering them attractive to ants and other insects. Such occur on Vetch, species of Begonia, &c.*

II. The Composition of Leaves.

Leaf Composition.—We must now consider how leaves are made. A typical leaf consists, visibly, of three parts—the petiole or stalk, the lamina or blade, and a pair of stipules. Any one or two of these may be wanting. Hence this is the most convenient method of regarding a leaf.†

The Petiole.—As this, usually a rod-like structure, has to carry the weight of the blade, which, in the case of Palms, may be enormous, it must be proportionally strong, especially at the base for leverage. It has, therefore, a strong cord or fibro-vascular bundle, running along the underside together with two or more smaller ones above it, a section through them showing that they are in a horseshoe-shaped curve.

When the cords enter the blade they send off branches forming the framework or "skeleton" of the blade, so as to display as large a surface as possible to the light. They thus constitute the supporting framework.

We have seen that the cords which enter a petiole issue directly out of the stem-cylinder, the largest and lowermost from the point immediately behind and below the point of insertion of the petiole. The others issue from more distant points and travel round till they enter the petiole at the sides of the first.

If there be stipules, *their* cords are given off from the lateral ones of the petiole. This is also the case in the so-called "adnate" stipules of the Rose.

When the base of the petiole spreads and makes a "sheath" of less or greater extent, sometimes completely investing the stem, as in Palms, it thus secures a greater "purchase" to sustain the weight of the blade. In some Palms the innumerable fibres cross each other, adding great strength to the petiole.

Such only fulfils a universal function in plants as in animals: that when strains are "felt" nature at once builds up tissues to meet them.

In large leaves, as of Umbellifers, it will be noticed that the two upper cords of the petiole form a pair of flanges. These supply much additional strength to resist the strain caused by the weight of the blade, and so prevent fracture.

Fox's steel umbrella-stays are made on the same principle, but the flanges are on the underside in order to resist the strain when the wind would blow the covering inside out, as well as due to curvature when the umbrella is open.

It is, therefore, of common occurrence to find petioles channelled along the upper side.

In some, however, the cords form a complete cylinder precisely as in stems. Such occurs in Maples and Horse-chestnut and in that of the

* A great many interesting details on stipules will be found in Lord Avebury's (Sir J. Lubbock) *Buds and Stipules* (International Scientific Series, vol. lxxxvi.).

† Lord Avebury adds the "leaf-base," as of a Rose-leaf: but I do not think this is necessary from anatomical considerations.

garden Larkspur. The petiole of this plant is hollow, precisely like the stem. When such is the case it is cylindrical and not grooved.

As an illustration of the way Nature meets a strain, Darwin describes how the petiole of a leaf of *Solanum jasminoides* increases its wood after having caught hold of some support. It has at first three coherent cords below, and two small ones above; but subsequently they become united into a cylinder by the intercalation of intermediate ones.*

There are many plants which have no blades to the petioles. When this is the case the latter become flat, and in some plants have their surfaces in a vertical plane. Such is a peculiarity common in Australian Acacias. They are called phyllodes. The *meaning* of this arrangement appears to be to guard against injury by too great a radiation of heat; another use of petioles, often seen in members of the *Umbelliferæ*, is to form a bag-like protection for the large flower-bud within it.

Akin to this use is the reduction of the petioles to make bud-scales. This is obviously the case in *Ribes*, Ash, and Horse-chestnut, as transitions to perfect leaves with blades can readily be seen on dissecting an expanding bud in spring-time.

In *Monocotyledons*, the stems have their cords scattered about the pith or ground-tissue. When a leaf is going to be formed, the cords usually throw out branches which interlace at the node, and so form a plexus, as described in Bryony. From this a number of cords pass out near the circumference and enter a flat leaf with a sheathing base. As the cords run parallel from end to end, monocotyledonous leaves are distinguished as a rule by being parallel or straight-veined.

In some water-plants, however, this long narrow leaf may ultimately develop a blade, as may be well seen in the Arrow-head (*Sagittaria sagittifolia*). This would seem to reveal the fact that the parallel-veined leaves of *Monocotyledons* are really of the nature of *phyllodes*; such being originally formed under water, as on the above-named and many other aquatic flowering *Monocotyledons*.

If the water be deep, no blades are formed in the Arrow-head; but if it be shallow, then, first, an elliptical blade appears, followed by a hastate; then a sagittate blade is the final result.†

Simple or One-bladed Leaves.—The two extreme forms of blades are *linear*, *i.e.* very narrow, and *orbicular*, or completely round. Grass blades illustrate the former, and Water-lily leaves the latter.

The varying breadth of blades is found to be largely dependent upon their position and exposure to the sun. When spread out horizontally the greater becomes the surface, as it can receive more light and consequently acquires a greater assimilative power.

If, on the other hand, the leaves of herbaceous plants be greatly crowded, as of Grasses, Sedges, Carnations, Thrift, &c., then the blades are obliged to stand vertically and assume a very narrow or linear form.

* *Climbing Plants*, p. 74, figs. 3, 4.

† For further details the reader is referred to *The Origin of Plant Structures*, p. 164.

Of course many terrestrial Monocotyledons have similar parallel-veined blades as Grasses; but there is reason to think such are referable to an original aquatic habit. See "A Theoretical Origin of Endogens from Exogens, through Self-adaptation to an Aquatic Habit," *Journ. Linn. Soc., Bot.* xxix. (1892), p. 485.

Moreover, the anatomical structure follows suit in that the tissue is alike on both sides, whereas, in horizontally-growing leaves, the tissues of the upper half are quite different from those of the lower.

In some leaves, as of *Alstrœmeria*, the blade is reversed in position as the petiole is twisted. This is perhaps due to an effort to increase the strength to support the blade. In such cases the tissues change places, so to say: those normally characteristic of the upper and lower sides now assume those of the lower and upper respectively, showing how readily Nature can adopt whatever structure is most suitable.

Vegetation may be subjected to great drought, as in the deserts, karroos, and veldts of Africa, where there is an insufficient supply of water to develop large leaves. Under these conditions plants of many different families have a "Heath-like" foliage, or that of the Cypress or Juniper. On the other hand, many may become thick for the storage of water, as *Mesembryanthemum, Sedum, Crassula*, &c.

Leaves of aquatic plants have also their peculiarities. Then, when they float they often acquire an orbicular form, as of Water-lilies, *Villarsia, Hydrocharis*, &c.

A mathematician * calculated what ought to be the best form of a blade when floating, to resist the strain of running water so as to avoid injury by tearing, and he found it to be that which Nature has adopted in Water-lilies, &c.

On the other hand, the submerged leaves are usually finely divided. Such occur in the Water Crowfoot, *Cabomba*, Water Milfoil, Water Violet, and many others. The inference is that such a form is attributable to the water. Experiments have proved that the excess of water by which the protoplasm is saturated can be drawn out through osmotic action, by rendering the water in which the plant grew of a greater density by means of salts, &c. Under these conditions the protoplasm of the stem was able to make the complete form of leaf under water as it does in the air.†

Compound or Many-bladed Leaves. — These are derived from simple leaves by the gradual separation of portions, *i.e.* metaphorically speaking, because they really develop freely; but as intermediate conditions are often found, so it is convenient to describe them thus.

If a Blackberry bush be searched, simple leaves occur with inflorescences; but below may be seen a simple but lobed blade. In other leaves the two lobes are quite free, and so a compound or "ternate" leaf results, of three leaflets. The two lower leaflets may be found lobed, and then a completely formed 5-lobed leaf results. The Cinquefoil (*Potentilla verna*) may have both simple leaves of one blade and 3-, 5-, and 7-bladed leaves, all on the same plant.

If a vigorous shoot of the Snowberry be examined, it appears to explain the meaning of compound leaves. It will be found to have *small* oval leaves at the base, and again at the end; while the leaves in the middle of the shoot are very much larger and lobed.

At the beginning and end of the season, vegetative vigour was weak;

* "A Theory of the Forms of Floating Leaves in certain Plants," by W. P. Hiern, M.A., *Proc. Cam. Phil. Soc.*, Oct. 1872.

† *Bot. Gaz.* xxxiv., Aug. 1902, p. 93.

but as it gathered strength in the summer, there was a contest between vigour and leaf-growth; so that though the blade was large it could not complete the enlarged oval outline. Hence arose the "lobing." If this be carried to excess the lobes become separate leaflets. An *advantage* to the tree or shrub is that, there being many small blades instead of large ones, light can fall between them and so reach the underlying or inner ones within the plant.

III. Origin of the Floral Whorls.

The Nature of a Flower.—A flower-bud is essentially the same thing as a leaf-bud, in that every separate part of a flower *might* have grown into a leaf, and such is sometimes the case *abnormally*. Thus the "green" Rose * is a foliaceous or leafy form of a "China" Rose. It is "double" in that it possesses many parts; but the carpels, stamens, and petals are all represented by green leaves; the staminal leaves often have one or two anther-cells along the margins.

Bracts.—The bracts, from the axil of which flower-buds arise, are also modified leaves. In some plants they are true leaves, but much reduced in size; such occurs on Willow-herbs, Beetroot, and Toad-flax.

More frequently a bract represents the petiole or else the blade only. Thus a perfect transition between a complete leaf and a floral bract can be seen on the Hellebore. As the stalk widens and shortens, the separate lobes of the blade become reduced in size and number, till nothing but an oval, pointed bract remains.

In Buttercups the reverse takes place, as the stalk is arrested and the segments of the blade decrease in size until a bract is formed consisting of two or even one only.

Sepals.—These are usually "homologous" with petioles only, as may be seen in any Rose, in which the outermost sepals of the five, at least, are still provided with rudimentary leaflets.

A common monstrosity of Primroses is for the upper part to develop into five true leaf-blades. Such Primroses are called "Jack-in-the-Green."

Petals.—These appear to have been made out of stamens, and not directly from leaves, as bracts and sepals were.

For certain plants, such as Water lilies and Cannas, have retained the transitional forms, so that a complete series from true stamens to true petals can be readily observed.

The filament widens and the anthers gradually disappear till petals are formed.

Stamens.—These existed long before petals were formed, as still shown by existing gymnosperms; and they take their origin out of green leaves. Such are still visible in Junipers and Cypress, &c., wherein the stamen consists of a green scale bearing the anther-cells at the base. In *Pinus* the upper part of the scale is yellow like the anther-cells themselves.

Yellow thus seems to have been the earliest known colour, other than

* This curious Rose was issued to the trade in 1856. It appeared in the catalogue of MM. Guillot *père* et Clément of Lyons as *Rosa viridiflora*, "à fleurs vertes, fl. moy. vert foncé, couleur du feuillage."

green ; hence it is regarded as the fundamental colour of all flowers, and to which they often "revert," as do Chrysanthemums.

Carpels.—These are obviously formed by a leaf folded upon itself or "conduplicate" : that is, like a piece of note-paper, but with the margins coherent. The ovules arise on these two coherent and greatly thickened margins, called the "placentas." There is usually one row at least on each margin, but they may be increased to many or reduced to one ovule.

The origin of ovules appears to be homologous with foliaceous outgrowths which often arise from the ribs and veins of Cabbage leaves, or as "crests" on some corollas of Begonias, Gloxinias, Primulas, and Daffodils. For, when a leaf will form a carpel, the fibro-vascular cord entering the base divides into three branches. One corresponds with the midrib of the leaf, the other two pass up the now enlarged margins and send off shoots into the ovules.

In monstrous conditions of flowers in which the carpels revert more or less to leaves, then the ovules may become like minute leaflets &c., as has occurred in Mignonette, Clover, and many other cases.*

Hence every part or "appendage" of a flower is homologous with a "foliar" structure.

Even when the ovule appears to rise from the base of the ovary, as in the *Compositæ*, the cord which supplies the ovule arises *laterally*, showing that it is really marginal and not axile.†

Number.—The number of parts of the whorls of flowers are usually fives, fours, and threes, and occasionally twos (Enchanter's Nightshade), or twice these numbers.

Fives are peculiarly characteristic of *Dicotyledons*. This is due to the fact that the arrangement of leaves in *Dicotyledons* is usually represented by the $\frac{2}{5}$ plan, five forming one "cycle" along the spiral line.

Similarly $\frac{1}{2}$ and $\frac{1}{3}$ plans are characteristic of the foliage of *Monocotyledons*, and these most easily give rise to cycles of three, as in the flowers.

The $\frac{2}{5}$ plan is easily obtained from opposite leaves (derived from the two opposite cotyledons) while the others are equally referable to the single cotyledon in *Monocotyledons*.‡ When, however, cycles become whorls, the individual members of the latter are so placed as to fall over the *intervals* between those of the next whorl below. Hence is recognised the "law of alternation" in flowers.

If exceptions occur, as when the five stamens of the *Plumbagineæ*, *Rhamnus*, and *Primula* stand in front of the petals, it signifies that a second outer whorl of stamens is suppressed. Rudiments of filaments occur in Brook-weed (*Samolus*), which thus reveal the ancestral numbers.

In flowers where an indefinite number of parts occur, as of stamens and carpels in Buttercups and Roses, then, as a rule, the spiral arrangement is retained. Nature, however, has another way of multiplying the parts of any whorl. This is done by a branching of the (say) original five fibro-vascular cords, which would enter as many stamens ; but each branch

* "Fasciation and Allied Phenomena," *Journ. R. Hort. Soc.* vol. xxvi. p. 155.

† Vascular System of Floral Organs &c.," *Journ. Linn. Soc., Bot.* vol. xxviii., pl. 29, fig. 6.

‡ I have fully explained this in my papers on Phyllotaxis : *Trans. Linn. Soc.* vol. xxvi. (1868), and vol. i. (*Botany*) (1875).

now enters a complete filament and anther, so that, instead of five or other number of stamens, these may be multiplied, as occurs in *Hypericum* and *Malvaceæ*.

When flowers are in whorls of twos or fours, the usual interpretation is that such have arisen from opposite leaves. This is well seen in members of the *Oleaceæ*, as Lilac, Privet, Ash, &c.

The Tormentil, however, has normally only a 4-petalled corolla, but occasionally there are five petals. This may be explained by this plant habitually living in a poor soil as of heaths, so that the number four has become a fixed character in this species of *Potentilla*.

Freedom and Union.—As leaves grow out separately from a shoot, so originally were all members of floral whorls *free*. But, from certain exigencies, the parts of any whorls may be united or "cohere" together. This cohesion is pre-eminently required for insect pollination, as will be explained hereafter.

Thus the five sepals of a Carnation or Primrose form a "cup"; hence the term *calyx*, the Latin for "cup." Similarly are the petals often united in flowers, as of the Primrose, Foxglove, Potato, &c.

In the Furze there are ten stamens with narrow flat filaments which cohere, edge to edge, making a tube; but the anthers are free; whereas in Composites the reverse takes place, the filaments being free and the anthers coherent into a tube.

With regard to the pistil, it is by far the most general rule for it to be composed of two or more carpels coherent into one body, as of a Wall-flower with two carpels, a Poppy with several, &c.

The Floral Receptacle.—The end of the flower-stalk, or floral receptacle, plays an important part in flowers. As the parts of a flower are much crowded, the extremity usually enlarges to carry them. This enlargement is well seen in a Strawberry, as it is the structure we eat. It is the "cone" inside a Raspberry and Buttercup. In all three the use is to carry the immense number of separate or free carpels.

Besides enlarging upwards, the end of the flower-stalk may spread out horizontally and form a sort of dish or groove round the pistil. Such is well seen in the flower of the Raspberry, and its use or function will be discovered to be the secretion of honey.

A further development takes place when the edges of the "dish" grow upwards and form a "cup" or "tube." Such occurs in the Cherry and Rose. The result is that while the carpels (single in the Cherry, but many in the Rose) remain below at the bottom and sides of the cup, the sepals, petals, and stamens are carried up and borne on the rim.

In the Cherry and Plum this cup or "receptacular tube," as it is called, disarticulates below and leaves the fruit to grow and ripen by itself. In the Rose the tube is persistent, and forms the "hep," full of free carpels (achenes), within it.

In many flowers an "adhesion" takes place during growth, between the receptacular tube and the ovary or ovaries. Thus, in the May with 1 or 2 carpels, in the Apple and Pear with 5, when these fruits are cut across they are found to be welded into the thick, fleshy, superficial tissue of the cup or tube.

To explain this we must remember that the tube, if *free*, as of the

Cherry, would have an *outer* and an *inner* skin, with an *intermediate* tissue.

So would the ovary of a carpel. But when the two are adherent, the *inner* skin of the tube and the *outer* skin of the carpel are arrested; so, then, the *two* "middle layers" are fused together, forming the fleshy edible body of the Apple. The "core" represents the *inner* skin of the ovary and contains the two pips or seeds, one on each margin of the carpel.* The primary use or meaning of the tube is, as stated, to secrete honey. In the Cherry the tube is lined with an orange-coloured honey disc; but when the tube is adherent to the ovary it is, of course, only the rim which can supply it. This rim is also orange-coloured in the Rose, but it appears to have lost its function in this genus, as bees only come for pollen.

In many flowers with adherent receptacular tubes, it is not the tube but the top of the ovary which undertakes the office, as may be seen in Elder, in which the exposed summit of the ovary and the base of the styles are thickened, but in the *Umbelliferæ* the top forms two cushion-like structures between which the short styles rise.

In some flowers the tube is prolonged far beyond the top of the ovary, as may be seen in the Evening Primrose, Fuchsias, and Narcissus.

In Apples and Pears the tube spreads out horizontally above the ovary, forming a little dish, and so carrying the sepals, petals, and stamens to a short distance from the styles which stand up in the middle.

"Adhesion" is also used for the members of one whorl when they adhere to one another. Thus whenever the petals "cohere," as of a Primrose, the rule is that the stamens "adhere" to them. Heaths and Canterbury Bells are exceptions.

Any parts of a flower may secrete honey (though it is most commonly done by the receptacle) by "glands," as in the Wallflower, which has two, and in *Geranium*, which has five, or by a complete ring or disc, as is characteristic of the *Disciflorœ*.

It is not very often that the sepals secrete it, but they form little bowls full of honey in the Lime. The petals of many Ranunculaceous plants are converted into honey-bearing "nectaries," as of Buttercup, Aconite, and Larkspur.

In some cases the stamens undertake the duty, as in *Atragene*, *Pentstemon*, and Chickweed. The carpels may also be honey-producers, either at the base of the ovary or on the sides, as of the carpels of Marsh Marigold, or the summit, as described above in Campanulas, Elder, and the *Umbelliferæ*.

Regularity and Irregularity.—These terms are used in reference to any whorl taken singly, to imply that all its parts are exactly alike or "regular," or else one or more may differ from the other in size, shape,

* It has been thought by some that such an "inferior" ovary, as it is called, is *entirely* "axial," i.e. the receptacular tube with the exception of the summit or style-bearing part (see Mudge and Maslen's *Class Book of Botany*, 1903, p. 288, fig. 153); but a study of the distribution of the fibro-vascular cords which are supplied to the carpels and ovules shows clearly that it is not so. I have illustrated the true arrangements in my "Vascular System of Floral Organs," *Journ. Linn. Soc.*, xxviii., pp. 159–60, pl. xxviii., Ivy, &c. See also figures of other genera with inferior ovaries. In *Alstrœmeria*, &c., the two included epidermides are sometimes partially incoherent and are then distinguishable as *epithelia*.

and colour so that the whorl is irregular. The former was the primitive form of flowers, and the latter is derived from them in special adaptation to some particular insect or insects which have habitually visited the flowers.

Floral Degradations.—These are evident in the loss of parts of flowers, in the presence of rudimentary organs, &c. Such imply adaptations to wind-pollination or to self-pollination, from a previous condition of insect-pollination.

IV. Pollination of Flowers.

The meaning of the structures of flowers described in the last lecture is pollination. Everything conspires to secure that "end."

Flowers are pollinated by means of insects, occasionally birds or water, by "self," *i.e.* by the pollen of the same flower, and by the wind.

Flowers pollinated by insects require some attractiveness; such is usually secured by their being white or coloured (other than green), or by scent.

The colour is usually situated in the corolla, but it may be in the bracts, as in the scarlet flowers of some of the *Cactaceæ*, Salvias, *Darwinia*, 'Everlastings,' and in the white ones of *Cornus*.

The sepals may be white or coloured as in *Clematis*, Hellebores, Marsh Marigold, Aconite, Anemone, and Larkspur.

Occasionally the stamens render the flower conspicuous, as of *Thalictrum* and the catkins of the Sallow Willow.

Following the order of headings in the last lecture as examples of *freedom* among the parts of flowers, one may compare the Buttercup having a *regular* flower, with Aconite, which has an *irregular* one. Or, again, *Geranium* with *Pelargonium*.

In the first pair, of the family *Ranunculaceæ*, it is the petals in which "nectaries" with honey are formed. In the latter, it is the receptacle which has glands (five in *Geranium*, and one, a long tube, in the floral receptacle).*

Of flowers with *coherent* petals, there are many regular, as the Heath, while others, as all of the orders *Scrophularineæ* and *Labiatæ*, are irregular.

Of flowers with "inferior" ovaries, *i.e.* such as are included in adherent receptacular tubes, the Canterbury Bell with its regular flower may be compared with Lobelia of the same family, which is irregular, or the Daffodil with Orchis.

In all irregular flowers a number of special structures occur which will soon be observed to be all "additions," so to say, with the object of adapting the flower more specially than is the case of regular flowers.† Regular flowers are almost always "terminal" at the ends of shoots, so that they can be visited from all points of their circumference. This

* I have illustrated the distribution of the fibro-vascular cords, showing the origin of this "axial nectary," *Journ. Linn. Soc., Bot.* xxviii. pl. 26, fig. 17 (3).

† The special peculiarities both of regular and irregular flowers in adaptations to insects have been so abundantly described that it would be needless to repeat them here. The reader is referred to Darwin's *Fertilisation of Orchids*, *Forms of Flowers*, and *Cross and Self-Fertilisation of Plants*, Müller's *Fertilisation of Plants*, and the writer's *Origin of Floral Structures*.

equally applies to the pendulous flowers of the Currant and Lily of the Valley; hence such flowers are symmetrical around a central axis; but irregular flowers are, on the contrary, almost invariably close to the stem, and are always visited on one side, the front only. Hence they are said to be bilaterally symmetrical.

Various suppressions of some parts, with alteration of forms of others, have taken place in converting a regular flower into an irregular one; but whatever they are, the result is in perfect adaptation to the habitual visitor.

Hence it is that, while an open regular flower, as that of a Buttercup, may be visited by scores of insects of different species, an irregular flower, as that of the Aconite, may be visited by only one kind.

As another feature: In many flowers the anthers mature simultaneously with the stigmas, so that the pollen, falling on them, pollinates them. This is called self-pollination, and is characteristic of many inconspicuous flowers; but the rule for conspicuous flowers is that the pollen is shed *before* the stigmas of the same flower are ready to receive it.

The *interval* varies greatly in different flowers and in different seasons. In many it is so great that every grain of pollen is shed, so that unless the flower be crossed it cannot set seed, but more generally the interval is not so great but that a *chance* is left for the stigmas to get pollinated and self-fertilisation is the result.

Even with highly irregular flowers and strongly "protandrous" (*i.e.* stamens first), as those of the Aconite, Larkspur, Lupin, Foxglove, &c., though specialised for insects, yet in their absence (as in a garden in London) appear to be self-fertile, by reducing the interval between the maturation of the anthers and that of the stigmas. There is another hindrance to self-pollination, with the danger of no seed being set, and that is the formation of an *obstruction* between the anther and the stigma. This occurs in most Orchids and is called the *rostellum*; so that, unless the pollen be removed by an insect and applied to the stigma, no seed can possibly be set.

Some few Orchids have acquired the power of self-fertilisation by the non-development of the rostellum; the pollen then slips down into the "stigmatic chamber" just below it.*

These facts prove that to be highly specialised is far from being of any advantage to a plant when we remember the only "ends" of plant life are to live and set seed.

On the other hand, it is the rule that flowers which can be self-pollinated and so self-fertilised are always most abundant, because they set an extraordinary amount of seed.

Hence the above two "ends" are best and infallibly secured by self-pollination.

An easy experiment will prove this. Let Groundsel, Chickweed, Shepherd's-purse, Black *Solanum*, *Urtica urens*, &c. have a free run of a garden. They will soon crowd out and destroy, in the struggle for existence, all the garden flowers or vegetables. It will be soon seen that there is no want of health or vigour about them.

* "On the Contrivances for insuring Self-fertilisation in some Tropical Orchids," *Journ. Linn. Soc.* xxi., p. 538. See *Origin of Floral Structures*, pp. 319, 253 &c.

Just as conspicuous flowers have come into existence through direct adaptation to insects, so self-pollination or else wind-pollination has been secured in their absence.

But each of these sorts of flowers has abundance of adaptive structures whereby the necessary result of plenty of seed is secured.*

* For further details the reader may consult "Self-fertilisation," *Trans. Linn. Soc.* 1877, and *The Origin of Floral Structures.*

NOTES ON SOME PLANTS AND FERNS FOUND ABOUT PETROPOLIS (S. BRAZIL), FEBRUARY AND MARCH, 1899.

By A. Worsley.

Leaving England towards the end of January 1899, and travelling *viâ* Paris and Lisbon, I reached Petropolis in February, and remained there long enough to fairly explore the surrounding country within a radius of eight to ten miles.

Words cannot describe the astonishing beauty of the scenery, which perhaps has no rival in the world.

Such short journeys as I made can be carried out in reasonable comfort, and the accommodation for travellers is passable.

The main object of my visit to Petropolis was to see *Hippeastrum procerum* "at home," and to gather some of the aldermanic bulbs. Thanks to the kindness of Monsieur P. M. Binot, of Petropolis, who personally conducted me to the mountains where this plant grows, I was successful in this quest.

The bulbs then gathered have ever since been a source of pleasure, and flower with tolerable regularity in their new home at Isleworth.

It was a great disappointment to leave without seeing the Botanic Gardens at Botafogo, with their matchless avenue of Palms. I had postponed my visit to them on account of a spell of distressingly hot weather which prevailed, the temperature being many degrees above the normal for the time of year. In addition to this an epidemic of yellow fever raged in Botafogo, which did not add zest to the idea of a visit. Ultimately some of the party decided to return to England earlier than had been arranged, so I missed seeing the famous gardens.

I would note that 2,500 feet is about the frost limit. Above 3,000 feet sharp *ground* frosts occur occasionally in July, and on the summits of the mountains *air* frosts. I noted a complete absence of Crinums in a wild state about Petropolis. However, on the margins of the Bay of Rio Janeiro, I saw several species, of which I was unable to obtain specimens.

Most of our common garden flowers are cultivated in the gardens of Petropolis, which indeed bear a studied resemblance to our own suburban gardens as far as the flower-beds are concerned. Of course the permanent plants, trees, and palms give quite a tropical and distinctive appearance to these Brazilian gardens, though the absence of any good lawns detracts much from their beauty. Yet I cannot see any reason why good lawn-grasses should not be introduced, as the climate seems very suitable for them, with abundant summer rainfall. Mowing machines do not seem to be much used in Petropolis, owing doubtless to the practical absence of lawns of any size. In fact I never saw one in use while I was there, but, with a supreme contempt for the enemy, the gardeners could be observed creeping over the grass armed with tailor's scissors, or with antique sickles.

Among the host of beautiful palms, *Cocos Weddelliana* was much

used in gardens as a decorative plant, and many indigenous tree-ferns also. *Musa sanguinea* flowers brilliantly in many gardens in early autumn (or late summer), but seems remarkably dwarf, most of the flowering plants varying between two and three feet in height. The bracts are blood-red, and make a striking display of colour.

In Monsieur Binot's garden I noticed many beautiful Bamboos, Azaleas, Dahlias, Gladioli, Roses &c.

Among Orchids, Cattleyas, Lælias, and Oncidiums predominated.

I did not see any Vines cultivated about Petropolis. It is said that the tremendous rainfalls which sometimes occur during the summer months render such cultivation almost impossible. Yet Vines are grown in the same State, and some indigenous (American) Vines are cultivated. I tasted the fruit of some of these Vines, which were presumably varieties of *Vitis Labrusca*. The fruits were almost black, small (about $\frac{1}{2}$ inch diameter), and very juicy, with practically no "flesh." The flavour was by no means sweet, but extraordinarily strong, and the aroma astonishing, both these latter being that of our Muscats in a concentrated form. I was told by some that this Grape was called "Isabelle," but others said that this was not so. I found few seeds, but have succeeded in raising two plants from seven seeds which I brought home. These are undoubtedly some form of the ubiquitous *V. Labrusca*.

It is evident, without much study, that either *V. Labrusca* includes an almost incredible number of distinct species, or that we are unacquainted with a great number of indigenous American Vines. Many of these, in a wild state, are climbing plants, and only fruit occasionally. They are all, as far as I am aware, "wine-making" Grapes as distinguished from fleshy "table" Grapes, and they are plants which, as a class, would require a process of selection and improvement before they could be grown commercially for any purpose.

I did not taste any wine of admittedly Brazilian origin, but abominable frauds are foisted upon those who attempt to obtain "Bordeaux," and it is with the greatest difficulty that any genuine French clarets can be obtained.

The tobacco of Rio Grande do Sul is far better than that grown about Bahia, and the best grades of the former approach more nearly to the tobacco of Cuba than does that of any other country.

Monsieur Binot informed me that neither Peaches, Nectarines, Apricots, nor Plums carried crops at Petropolis, and that whenever there was any fruit a maggot ruined it. Certainly in the months that correspond with our August and September no local fruits whatever were obtainable in the markets of Petropolis beyond Cucumbers and Bananas of sorts. Yet the soil would seem to be an almost ideal vine and fruit soil, being composed of broken-down granite and spar mixed with older ferruginous earths.

I have marked epiphytic plants, including those growing on bare rock, with the symbol (E) after the specific name.

My thanks are due to Mr. W. B. Hemsley, of Kew, for the determination of many dried specimens which I brought back and gave to the Herbarium of the Royal Gardens, Kew.

Eighty-eight species in all are mentioned in the following notes.

Some Plants Noticed in Gardens at Lisbon and Vicinity.

In Lisbon are many gardens carefully tended, and advantage has been taken of the most favourable and equable climate in Europe to naturalise a number of exotics, especially among palms and trees. Many of these have been recently imported from well-known English firms. The Jardim Botanico seems to lead the way in this respect. The King's garden at Cintra is one of the most charming places that I have visited, and I should doubtless have made an interesting list of plants growing here had it not been for a tremendous thunderstorm that cut short our visit when we had only seen the lower parts of the garden. Although only lasting a short time, the storm was of tropical violence, the rain bouncing up from the ground to a height of four or five feet, so that we were all drenched through instantaneously.

The climate is sufficiently moist for a number of beautiful Ferns to grow on walls and rocks.

In the Jardim Botanico many plants bore their correct botanical names, and it was frequented by students, so that it is evident that the cost of such gardens is by no means wasted, and that considerable interest is taken by the Portuguese in natural history, apart from mere decorative gardening, for which the national genius is so marked.

Narcissus Tazetta.—Flowering in February in gardens and in a wild state.

Narcissus Tazetta var. *papyraceus.*—Flowering in February in gardens.

Agapanthus umbellatus.—Hardy, in gardens at Estrella, Lisbon.

Musa Ensete.—Hardy, in gardens at Estrella.

Bismarckia nobilis.—This splendid palm is thriving in Lisbon gardens.

Washingtonia filifera.—This fine palm has also been planted in many gardens.

Lachenalia pendula.—Flowering in February in gardens at Lisbon, but not quite at home, evidently.

Strelitzia spp.—Two species, one of which was almost certainly *S. Reginæ*, are hardy in Lisbon, but not in flower during my visit.

Coniferæ.—Many exotic conifers are found in gardens, and the majority are flourishing wonderfully, but I had no time to examine them.

PETROPOLIS,

Various Plants, Ferns, &c. found in the Neighbourhood of.

Gleichenia pubescens, H. B. K.

Adiantum cuneatum, Lange and Fisch.

Asplenium Shepherdii, Spreng.—I have this under cultivation.

Gymnogramme calomelanos, Kaulf, seems to be widely spread in South America and in Central America. I have gathered it in Venezuela and Jamaica. [Worsley, "Distribution of *Amaryllideæ*," Wesley, 95.]

Pteris, near *P. deflexa*, Link.

Nephrodium, near *N. sanctum*, Baker.

Nephrodium molle, Desv. (?)

Nephrolepis cordifolia, Presl.

Polypodium pendulum, Sw.

Lomaria procera, Spreng.

Blechnum polypodioides [*B. unilaterale*] (E). A more beautiful form than that cultivated under this name at Kew. With me the young fronds take the same brilliant ruddy and pink coloration that they displayed in their native haunts. It is very common, growing on the wet rock-cuttings by roadsides. Altitude 2,500 feet.

Anemia tomentosa, Sw.

Lycopodium reflexum, Lam.

Lycopodium cernuum, Linn.—I also gathered this in Jamaica.

Rubus rosæfolius, Sm. (?)—This Himalayan plant is at least allied, if not identical, with the "wild Strawberry" of Petropolis roadsides. This fruit is sweet, but watery, and lacking flavour. It is not cultivated anywhere. The leaf is like a Blackberry, and the fruit more like a Raspberry than anything else.

Cuphea spicata, var., Cav.

Jussiæa longifolia, DC.

Fuchsia sp.—A small-leaved sub-scandent form.

Rhynchanthera sp.

Begonia sanguinea, Raddi ?—I gathered seeds.

Begonia sp.—Flowers small, white, in crowded heads on long stems. Foliage large, thick, tomentose. Plants 4–6 feet high.

Lobelia thapsoidea, Schott.—A very striking plant like an Asphodel, growing in marshy places. Height about 8 feet. Flowers purplish and rosy-red. Flowering in February and March. The seeds I gathered proved infertile.

Thyrsacantha sp.

Lycium sp. ?—An injured specimen, difficult to determine.

Renealmia exaltata, Linn. f.

Billbergia pyramidalis, Lindl.

Tinantia fugax, Scheidw. ?—Common on roadsides.

Dichorisandra sp.—By the roadside near the "Punta de Hierro," about 300 feet below the summit of the Sierra.

Epiphyllum truncatum.—I gathered this hanging down from the roof of a cave, or grotto, where we lunched.

Tradescantia sp.—Flowers pink, small, flowering in February by the roadsides along the "Rua de Westphalia," near Petropolis. Common.

Cocos Weddelliana.—Common in gardens.

Solanum Worsleyi [W. Watson in 'Gardeners' Chronicle,' 1900, xxvii., p. 18, fig. 5]. A sub-scandent plant whose red fruits are eaten (after cooking) as "hors-d'œuvre," and possess tonic and astringent properties. Can be cultivated out of doors, in good seasons, like the Tomato, and makes a decorative conservatory plant.

Hedychium coronarium (*H. maximum* of some).—Common in damp places at the sea level, especially round Maua.

Musa sanguinea.—Common in gardens, flowering in February.

Sanchezia nobilis.—In the forest. Some forms are plain in the leaf, others well variegated and veined. Fairly common.

Tree Ferns are plentiful, growing generally 5–8 feet high, and generally resembling those of Jamaica.

Philodendron sp.—Unascertained, below the summit on the Rua "Uniao y Industria."

Philodendron sp. (perhaps unrecorded).—Growing intertwined with *Hippeastrum procerum* on the summits and rocky ledges of the mountains. The leaves are simple, and the flower-spathes green, with red bases. A rambling Aroid, mostly running along the ground. I have this in cultivation.

Nothoscordum fragrans, Kunth.—A white Allium. This also must have a wide range, as I have gathered it wild in Grand Canary.

Amaryllids.

Hippeastrum procerum (E).—Apparently limited in habitat to the upper portions of a few mountains above the Facienda Inglez, but gregarious there. Altitude 4,000 feet.

Hippeastrum correiensis. (E) (Bury, 'Hexand.' 9).—Grows with *H. procerum*. This is the *H. Reginæ* of some Brazilian authors.

Crinum (sp.)—Unascertained; in gardens only.

Crinum amabile (?).—In gardens only.

Hymenocallis (sp. 1).—Unascertained; in gardens only.

Hymenocallis (sp. 2).—A dwarf kind, unascertained; in gardens only.

Alstræmeria inodora var. *nemorosa* (Gardn.).—Petropolis, on the banks of the levadas on the outskirts of the town. Flowering in February. Growing amid other herbage. I could not find any infertile (leaf) stems, although such may have grown at some other period of the year.

Flowering stems.—Wiry, 2 feet (or less) high, bearing a few irregularly disposed leaves, 2 inches long by $\frac{3}{4}$ inch wide, on distinct, spirally-twisted pedicels.

Flowers in simple umbels of 8 (or rarely 9), surrounded by about a dozen foliose bracts. Each flower semi-patent on pedicels about an inch long, the upper segment and the lower-wing segments the widest ($1\frac{1}{2}$ inch long by less than $\frac{1}{2}$ inch wide), the upper-wing segments narrower ($1\frac{1}{2}$ inch long by less than $\frac{1}{4}$ inch wide), the lowest segment the shortest (over an inch long by less than $\frac{1}{4}$ inch wide). Span an inch to $1\frac{1}{4}$ inch. Colour crimson, externally tipped green; internally striated and marked with brown, red, &c.; the apices of the upper-wing segment and of the lowest segment showing more green internally than the other segments show. Inodorous.

Filaments.—$1\frac{1}{4}$ inch long. Anthers yellow, pollen green.

Style.—Generally slightly exserted, stigma deeply trifid.

Fruit.—Immature.

Ovules.—About 8 in. each cell, superposed.

Notes.—I did not find this cultivated anywhere, and, indeed, it is not worth cultivating, yet I found several flowers semi-double.

The filaments were not attached to the base of the segments, but were quite independent. The nearest ally cultivated in Europe is probably *A. pulchella* (*psittacina*), which has fewer flowers.

Alstræmeria (sp.).—In the forests at altitudes of 4,000 feet. This species was distinct from the above, but of no horticultural merit.

Hypoxis (? sp.).—A minute plant, with about five yellow flowers flowering in February.

This grows here and there in Petropolis, on the grassy sides of the roads. It does not seem very far removed from *H. erecta*, a North American representative of this genus.

Irideæ.

Marica Helenæ (sp. nov.).—This beautiful plant is certainly not identical with *Marica cærulea* (*Cypella cærulea*, Seubert ex. Hook. f. in "Bot. Mag." t. 5612), although it might, perhaps, be treated as a variety of it. Yet I think the differences are more than varietal; the plant is also of much hardier constitution, and will stand some frost without injury.

The seeds which I brought back quickly grew into flowering plants, which have in turn produced fertile seeds at Isleworth, and my plants flower regularly in spring or early summer.

At Petropolis the seeds are ripe in March, which corresponds with our September, so that the seedlings have inverted their seasons to suit ours with exactitude, for with me seed ripens in September. In two years from the time of sowing (Ap. '99) the plants bloomed, and they differed from the *M. cærulea* of Seubert's figure in their much longer, and somewhat narrower, indigo-blue "falls." In the case of *M. Helenæ* the reflexed apices alone measure $2\frac{1}{2}$ inches long, and the span of each flower is from $4\frac{1}{2}$ inches to nearly 5 inches.

In the bud state the flowers are almost black, and at no time show any trace of pink as in Seubert's figure. The "standards" are much more distinctly vittate, and are of a deep velvet-blue in two marginal stripes, with a white keel of equal width between them.

The flower scape is like a leaf, very thin and long, deflectant, and semi-prostrate, but the individual flowers are erect and expand successively, and singly, at intervals of a day or two. They are inodorous and each one is a thing of beauty for one day only, for by next morning it is twisted up and has almost disappeared.

The foliage does not differ materially from *M. cærulea*, and is semi-glaucous.

M. Helenæ will grow outside during the summer and will carry seed, but should be housed on the approach of frost, although I have exposed it to some degrees of frost without serious injury. Very possibly the plant might even pass the winter outside with protection, but I should doubt its ability to flower well in our climate.

However, it succeeds well in a greenhouse temperature, if the air is sufficiently moist. The plants are not deciduous, and should never become desiccated.

Marica (sp. Glaziou, 18556).

Sisyrinchium (?) sp.—Near the Facienda Quitandina, on the road-sides in partly shaded places, flowering in March.

Root-stock.—Bulbous, minute.

Leaves.—Distichous, alternate, short, the edges inflected, about 11, sheathing the stem in the lowest inch thereof; about 3 inches long by $\frac{3}{8}$ inch wide.

Flowering stem.—Simple, sub-spirally erect, over 1 foot high.

Flowers.—Borne singly in succession from the top of the scape, on very slender, short pedicels. Fugacious, scentless, small, regular, full yellow, $\frac{3}{8}$ to $\frac{1}{2}$ inch diameter.

Stamens.—Three, stigma trifid.

Fruit.—Green, with 3 ribs, about $\frac{3}{8}$ inch long by $\frac{1}{4}$ inch diameter.

Seeds.—Immature when gathered.

Orchidaceæ.

Habenaria secunda, Lindl.—Flowers white.

Epidendrum sp. nova ?—Rather like *E. elongatum*. Flowers purplish-pink. I gathered this by the roadside on the Via Uniao y Industria, about 500 feet below the summit. Leaves rigid and thick.

Cyrtopodium (E).—Two species grow in the woods on the stumps of trees, or on stout roots near the ground level.

Oncidium crispum giganteum (E).—An interesting plant which flowers with me occasionally. Altitude 3,500 feet.

Sobralia sp.—A terrestrial Orchid with long, tapering root-stock, like that of some Batatas. It carried, on a short, terminal raceme, three beautiful purple, "Cattleya-like" flowers, with yellowish-white throat.

Lælia crispa (E).

Zygopetalum (E).—Several species (or vars.), unascertained.

Bamboos.

I recognised about half a dozen species, none of which, I believe, exist in British gardens.

The most common and the most useful decorative species is a decurrent plant, with closely-set, small leaves, something like the *Arundinaria nitida* of our gardens.

This plant prefers a cliff, and its slender stems run down and bend over for a long way. It has no strength to bear the weight of its own leaves in any other position. It can be seen almost anywhere, by roadsides, on cuttings, cliffs, &c.

There are two fine erect Bamboos, after the style of *A. Simoni*, which grow 30 to 50 feet high, and form impenetrable thickets. One of these species has yellow stems.

In cutting chapadas in the mountains we often made tunnels, or caverns, 30 yards long, through groves of Bamboos so dense as to cause the interior to be almost in darkness.

In the mountains one giant form exists, which Monsieur Binot informs me grows to still grander stature in the far south of Brazil (Rio Grande do Sul). This species, grows not erect, but at an angle of roughly 45° with the horizon. Its branchlets stand out very sparsely at right angles with the main stem, which, from its posture, becomes pendent towards its apex. The main stem grows with extreme rapidity, and quickly reaches a length of 40 to 60 feet, and a girth of 1 to $1\frac{1}{2}$ feet diameter at the base. It is a most conspicuous object in the mountain regions, but is only occasionally met with near Petropolis. I only saw a few specimens, from which I took the above particulars.

Monsieur Binot also tells me that there is one form which is an "annual," seeding and dying regularly. I was unable to ascertain for certain whether this occurred every year, or whether it occurred (as with some South Asiatic species) at times, in a variable way, but contemporaneously.

I think there may be more than six species of Bamboo about Petropolis, but I could only discern five which were undoubtedly so, and perhaps four others doubtfully so.

AGRONOMICAL NOTES FROM SOUTH AUSTRALIA.

By F. E. H. W. Krichauff, Cor. Memb. R.H.S.

I have read "Horticultural Education in Greater Britain," by R. Hedger Wallace, F.R.H.S., in vol. xxviii. (October 1903) of the Journal of R.H.S. He desires discussion, or to be corrected on matters which escaped his notice. Australia has not received as much notice as it deserves, but I will merely refer to South Australia. Of the other States of the Commonwealth I am unable to give as full information as may be desirable.

South Australia depends apparently more on the prosperity of rural industries than any of the other States. Founded as a Colony, although named a "Province," in the year 1836, some years elapsed before much use could be made of a rich soil, but in a dry and unknown climate. There was, however, one great advantage for the new settlement. No convicts could be transported to it, and the free emigrants were of the right sort. They had to follow Pope's lines :

> First follow Nature, and your judgment frame
> By her just standard, which is still the same,
> Unerring . . .

and they were not disappointed. Agronomical science was in its infancy, but a virgin soil yielded to practical farmers and gardeners more than fair crops. The settlement had a hard struggle, though, until diggers for gold returned from Victoria. Although the Government obtained large sums from the sale of Crown lands for cash, rural industries were left to themselves. Only twenty-five years later, when crops felt the gradual exhaustion of the soil, public attention was directed to the decline of farming and gardening. Certainly good roads and bridges and railways had been built, but the price of land had been forced ahead by undue speculation, and very many settlers found it difficult to make a living. The opening of Crown lands on lease, with right of purchase, assisted a good many, who sold their freeholds and moved to these agricultural areas, which were again subjected to the same system of exhaustion. Then at last it was found necessary to apply technical education and instruction in modern practical and scientific methods, and not the least advantage was derived from the visiting rounds made among farmers and gardeners by the Inspector of the leases granted by the South Australian Company, to which company South Australia has been so much indebted since its foundation. Thus was spread far and wide valuable information of improved agronomical methods. The State Government became suddenly aware that these were becoming absolutely necessary, and Parliament granted not very large sums, but sufficient to greatly advance the

knowledge as regards the best modes of again enriching the exhausted soil. Farmyard dung was both insufficient in quantity and of poor quality. Long dry summers, occasionally even protracted droughts, presented difficulties which a new emigrant could not easily overcome without advice.

It is surprising that, although the Government has spent very large sums to provide the city of Adelaide and suburbs and many country towns with reservoirs, private enterprise has done very little until recently in obtaining a supply of water from the bowels of the earth by means of artesian and tube wells. The great success that many have had with irrigation therefrom, making themselves almost independent of the rainfall, now invites imitation.

One matter of very great importance was some years ago successfully introduced, viz. for the State to buy up large estates, which former legislation had enabled wealthy men to gradually acquire, and to utilise them (formerly, probably, only used for grazing) for subdivision and settling thereon an agricultural or horticultural population.

Instruction in the theory and practice of horticulture, chiefly in the treatment of vines and fruit trees, is now given in evening lectures, and on Saturday afternoons by demonstrations, at the Technical School of Mines in Adelaide, and at other times at the Roseworthy Agricultural College and Experiment Station, by Mr. Geo. Quinn, the horticultural instructor, who has also been very successful in fighting the codlin moth. His lectures have been well attended. The number of students at the Agricultural College is fifty, of whom sixteen are enjoying free scholarships for three years. Another officer is giving advice to persons who have settled on the banks of the River Murray, and a third officer to holders of small blocks of land leased in perpetuity, or with a right of purchase from the State. One weekly newspaper deals with horticulture alone, another mainly with it, and the two excellent weekly general newspapers always contain columns of matter highly interesting to producers. The "Journal of Agriculture," of forty to sixty pages, is a monthly publication issued by the Government at one shilling for the twelve months, for which officers of the Agricultural Department write articles on agronomy generally. The reports from the Agricultural Council of 15 unpaid members and 110 Branch Bureaus, containing many useful papers read at their meetings, are also published therein, as well as the proceedings and papers read at the yearly congress of the branches at Adelaide, and of nine conferences held at different parts of the State. Some of these papers, read on these occasions by intelligent and practical colonists, are well worthy of more general, than of merely local, distribution. Some of the common schools and some of these bureaus have experimental plots, kept by the most intelligent of their members, where seeds and plants of economic value are tried and, if found suitable, distributed. Experiments, probably more exact and on a larger scale, are carried out at the Agricultural College. The Government and vendors of fertilisers supply also, to suitable persons, manures for experiments in different localities. To these ocular demontsrations is mainly due the rapid increase in the use of at least phosphatic manures in this State. The Inspector of fertilisers believes that only 700 tons

were used in 1896, 3,000 tons in 1897, 12,000 tons in 1898, 16,500 tons in 1899, 24,000 tons in 1900, 31,400 tons in 1901, 37,500 tons in 1902, and 44,500 tons in 1903. Fortunately phosphatic rock has now been found within the agricultural centres of the State, so that the price is likely to become much lower, and still more will be used. I have no idea what quantity of phosphatic fertilisers is used in England; but if the same proportion as of potash is only used, which according to Dr. Paterson (in the "Scottish Farmer") is only 55 lbs. per 100 acres of arable land, then our farmers and gardeners show that they are becoming awake to their interest, even more than English farmers, in contradistinction to those of Scotland, who use 227 lbs. per 100 acres. It must be admitted, however, that our settlers are not yet prepared for the use of a well-balanced general manure. It is with these too often merely a phosphatic manure alone which is applied, to the neglect of potash, nitrogen, and lime. A few more years will show them that the soil cannot be drawn upon for ever to supply these. Their crops will become poorer notwithstanding the usual manuring with phosphates.

As further assistance to the spread of scientific research, I may state the following. Having passed my examination in horticulture with honours after an apprenticeship at the Botanical Garden of Kiel, and having attended as *studiosus philosophiæ* the Berlin University, I became a settler in South Australia, and subsequently acted for thirteen years as chairman of the Central Agricultural Bureau from its inception, with about 1,500 members in all branches. As such (and now also), I applied my leisure in extracting desirable articles from the English and American Press, and translated others from German and French agronomical papers, which appeared in our "Agricultural Journal," and now in weekly newspapers.

Dr. Holtze, director of our Botanical Garden at Adelaide, always instructs some young men practically and theoretically in horticulture. There is also a Botanical Garden at Port Darwin, in the Northern Territory, where tropical plants are tried, and information respecting their cultivation can be obtained. In 1898 Dr. Holtze was instructed to plant in our hills, twenty miles from Adelaide, a typical orchard which contained in June 1903 5,254 trees and about 2,000 bush fruits. This collection has been made from various, but the best known, sources, yet we find that the varietal names cannot all be guaranteed until all the plants have fruited; synonyms have also to be eliminated. The whole of the expense of the Botanical Garden, the typical orchard, the Agricultural College (so far as it cannot keep itself from the produce raised), the officers of the Agricultural Council, the inspectors against the introduction and spread of noxious insects and vegetable diseases, is paid by the Government. So far, South Australia is free from phylloxera; but, as Victoria and New South Wales are badly infected, our vine-growers tax themselves, through a Board elected from their own number, for the purpose of keeping inspectors to visit all vineyards, and they amass a fund, from which the owners of vineyards, that may sooner or later have to be destroyed, can be partly indemnified.

Market-gardening has not to any extent fallen into the hands of Chinamen. In the Mount Lofty Hills there is a sturdy and generally

well-to-do class of market-gardeners, practically by no means behind the age, and they are intelligent observers of scientific research. Quite a sufficient number of efficient gardeners can be hired. Our suburbs are very gay also almost all the year round with scarce and well-cultivated shrubs and flowers.

Drying and preserving fruit has now become a very important industry, and the export of fresh fruit is growing from year to year. Last year 86,414 bushels of fruit and 29,243 packages of vegetables were exported, under the supervision of inspectors, to other parts of the Commonwealth; 4,085 cases of Apples, 235 cases of Pears, and 498 of Grapes were sent to London through the Produce Depôt. Others were sent to Germany and South Africa; 10,000 cases of Apples are now wanted for Hamburg, where they are preferred to American and Tasmanian Apples. Since the spraying against codlin moth has become more general, the export of Apples is likely to become very large. But of all rural industries the wine-making is the most promising. As to the quality of the better wines I need only mention what such a good judge and extensive dealer in wines as Mr. P. B. Burgoyne, of London, said when visiting this State last year: "I have tasted wines with an elegance and finish not surpassed by other wine-growing countries. Of this you may well be proud." And his large purchases here show that he fully believes in the excellence of our wines. Of the many fairly large wine-making establishments that of Mr. B. Seppelt is pre-eminently noteworthy. In fact it has been styled "the show-place of South Australia," and Mr. Burgoyne said of it, "you may travel the world over and not find more intelligence thrown into an industry, nor will you find greater perfection in the wine establishments of any country." And Professor Perkins has said: "I know of no cellars, either here or in Europe, so perfectly conceived, from the general plan down to the minutest detail, for handling economically enormous bulks of wine." 440,000 gallons were pressed at Seppelt's in 1903. The cellars hold about one million gallons.

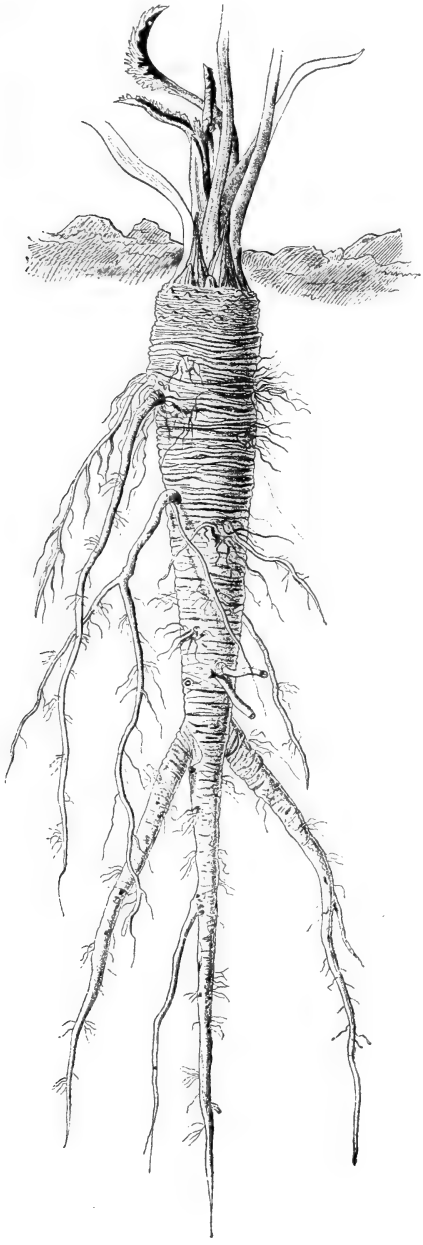
There are at present 797 acres under Currant vines, and in 1902 20,860 acres were under wine Grapes in this State. Last year 250 tons of dried Currants were grown, and this year it will probably amount to 350 tons. In 1902, 157,300 gallons of wine, brandy, and other spirits (equal to 105,000 gallons of wine) were exported to the other States of the Commonwealth; 650,795 gallons were exported to London, while a total of 2,573,422 gallons was pressed, leaving 5,535,694 gallons in the cellars; 700,000 gallons were used for distilling spirits.

As to the suitability of South Australia for the growth of Currants, I may mention that one old Currant vine produced last year no less than 386 lbs. of dried Currants. The best Grapes grown or purchased by wine-makers are 'Carbenet Sauvignon,' 'Malbes,' 'Shiraz,' 'Dolcetto,' for red wines; 'Riesling,' 'White Hermitage,' 'Frontignac,' &c., for white wines. From £3 10*s*. to £4 15*s*. a ton is the price.

The pressing of oil from Olives is another promising industry. Sir Samuel Davenport, K.C.M.G., and a few others have succeeded in making Olive oil superior to most of that imported.

South Australia was not well wooded when the first settlers landed, except on some few hills. On better soil in the plains stately Eucalypts

grew in park-like fashion, or on the margin of creeks, while very large tracts were covered with Mallee, a scrubby Eucalyptus, and other bushes. The interior was, and still is, almost treeless. Since 1874, reserves, under a Forest Department, have been proclaimed, and on these 13,000 acres are planted with forest trees, many of which are now fit for different purposes. Date Palms also have commenced to bear.



TRUST DEED OF THE WISLEY ESTATE, SURREY.

Stamp 10/-

THIS INDENTURE made the 24th day of September 1903. BETWEEN CECIL HANBURY of No. 5 Fenchurch Street in the City of London Esquire ELLEN WILLMOTT of Warley Place Great Warley in the County of Essex Spinster and JOHN THOMAS BENNETT-POË of 29 Ashley Place London Esquire (hereinafter referred to as the Trustees) of the first part SIR THOMAS HANBURY of La Mortola in the Commune of Ventimiglia Italy at present residing at Combe Bank Sevenoaks in the County of Kent of the second part THE TRUSTEES and SIR JAMES JOHN TREVOR LAWRENCE of Burford in the County of Surrey Baronet the President of the Royal Horticultural Society JOSEPH GURNEY FOWLER of 3 Fredericks Place Old Jewry in the City of London Treasurer of the said Society and THE REVEREND WILLIAM WILKS M.A. Secretary of the said Society of the third part and THE ROYAL HORTICULTURAL SOCIETY (hereinafter referred to as the Society) of the fourth part. WHEREAS by an Indenture dated the 9th day of September 1903 and made between Bernard Alexander Wilson John Griffin Bristow and Herman George Wilson of the one part and the Trustees of the other part in consideration of the sum of £5,000 therein expressed to be paid by the Trustees to the said Bernard Alexander Wilson John Griffin Bristow and Herman George Wilson certain hereditaments and premises comprising Sixty acres or thereabouts situate in the Parish of Wisley in the County of Surrey and in the said Indenture now in recital particularly described (which said hereditaments and premises are hereinafter referred to as "the Wisley Estate") have been assured by the said Bernard Alexander Wilson John Griffin Bristow and Herman George Wilson unto and to the use of the Trustees their heirs and assigns AND WHEREAS the said sum of £5,000 paid for the purchase of the Wisley Estate was in fact money belonging to the said Sir Thomas Hanbury as the Trustees do hereby admit AND WHEREAS the said purchase was made by the said Sir Thomas Hanbury for the purposes and objects hereinafter appearing and subject to an arrangement that the Trustees should execute such a Declaration of Trust in favour of the Society and otherwise as is hereinafter contained AND WHEREAS it has been agreed that the Trustees and three representatives of the Society shall act together as a joint body (hereinafter referred to as "the Committee") for the purposes and with the powers hereinafter mentioned and that such representatives of the Society upon the Committee shall be the President and Treasurer for the time being of the Society who shall always ex officio be two of such Representatives and a third person either an Officer or Fellow of the Society who shall be nominated and appointed from time to time by the Council of the Society and that the said Sir James John Trevor Lawrence the present President and

Enrolled in the Central Office of the Supreme Court of Judicature the 18th day of December in the year of Our Lord 1903 (being first duly stamped) according to the tenor of the Statute made for that purpose. 134. P.

Seal of Supreme Court of Central Office Enrolment Department. Judicature.

Joseph Gurney Fowler the present Treasurer and the Reverend William Wilks the Secretary of the Society (who has been nominated by the Council of the said Society to be its third Representative upon the Committee) shall be the first Representatives of the Council upon the Committee NOW THIS INDENTURE WITNESSETH that in pursuance of the said arrangement and in consideration of the premises THEY the Trustees at the request and by the direction of the said Sir Thomas Hanbury DO HEREBY DECLARE that the Trustees and the survivors and survivor of them and the heirs and assigns of such survivor do and shall stand and be seised of the Wisley Estate upon the trusts and to and for the intents and purposes and subject to the powers conditions and provisions hereinafter contained of and concerning the same that is to say :—

1. THE TRUSTEES shall henceforth during the existence of the Society or until the Trustees shall receive such a notice from the Committee as is hereinafter mentioned permit the Society to use and occupy the Wisley Estate or such portion thereof as the Society may require for the purpose of an Experimental Garden and the encouragement and improvement of scientific and practical horticulture in all its branches.

2. THE TRUSTEES may from time to time with the consent of the Committee and upon such terms as the Committee shall approve demise or let any part or parts of the Wisley Estate not required by the Society for their own occupation for any term of years not exceeding seven years and shall until the receipt of such notice as aforesaid permit the Society to receive and take the rents and profits of such portion of the Wisley Estate as may not be in the actual occupation of the Society.

3. PROVIDED ALWAYS and it is hereby agreed and declared that the Society shall during the existence of the trusts aforesaid in their favour pay and discharge all outgoings in connection with the Wisley Estate including rates taxes tithe rent charge land tax fire insurance repairs and other like matters and shall keep the Trustees indemnified against the same.

4. IF AND WHEN the Society shall cease to exist or the Trustees shall receive a notice in writing from the Committee signed by a majority of the members thereof to the effect that in the opinion of such majority the Society does not any longer require the use and occupation of the Wisley Estate or any part thereof for the purposes aforesaid or that the financial condition of the Society does not enable the Society to maintain such garden to the satisfaction of the Committee and to fulfil the obligations imposed on the Society by these presents then and in any of such cases the trusts herein contained in favour of the Society shall cease and determine and the Committee shall be dissolved.

5. UPON the termination of the trusts herein contained in favour of the Society the Trustees shall offer the use and occupation of the Wisley Estate to the authorities of the Royal Gardens at Kew upon similar

terms and conditions as are hereinbefore contained with respect to the Society or as near thereto as may be with a right to the authorities of the Royal Gardens at Kew to appoint three nominees to act with the Trustees as a Committee having such powers and duties as are conferred on the Committee by these presents and if the authorities of the Royal Gardens at Kew fail to accept such offer within three calendar months from the date thereof the Trustees shall thereupon make a similar offer in all respects to and in favour of the Royal Botanical Society and if the Royal Botanical Society shall fail to accept such offer within three calendar months from the date thereof the Trustees shall make a similar offer in all respects to some other Society or Association which may appear to the Trustees to be suitable and appropriate for the purpose of maintaining and utilising the Wisley Estate as an Experimental Garden with a view to the encouragement and improvement of scientific and practical horticulture.

6. THE WISLEY ESTATE shall at all times be vested in not less than three Trustees and the power of appointing new Trustees of these presents shall be vested in the said Cecil Hanbury Ellen Willmott and John Thomas Bennett-Poë and the survivors of them during their joint lives and in the survivor of them during his or her life and after the decease of such survivor in the Society until the determination of the trusts in favour of the Society hereinbefore contained In the event of the number of Trustees at any time being reduced below three it shall be the duty of the surviving Trustees or of the Society as the case may be (but without imposing any liability as for a breach of trust in the event of non-fulfilment from any cause) at once to appoint a new Trustee or Trustees so as to bring the number up to three.

7. THE PRESIDENT and Treasurer of the Society shall as hereinbefore mentioned at all times be ex officio two of the representatives of the Society upon the Committee and the third representative of the Society shall be such person being an officer of or a Fellow of the Society as shall from time to time be nominated and appointed by the Council of the Society who shall also be removable by the Council and accordingly if and when the said Sir James John Trevor Lawrence and the said Joseph Gurney Fowler shall respectively cease to hold the offices of President and Treasurer of the Society (except and unless either of them shall hereafter be nominated by the Council as the third representative upon the Committee as aforesaid) they shall respectively cease to be members of the Committee and the succeeding President and Treasurer respectively shall be ex officio members of the Committee in their places respectively jointly with the Trustees for the time being and the third representative of the Society and upon the death retirement or removal of the said Reverend William Wilks or other the third representative for the time being of the Society from the Committee the Council shall nominate another representative in his place.

IN WITNESS WHEREOF the several persons parties hereto have hereunto set their respective hands and seals and the Society has caused

its Corporate or Common Seal to be hereunto affixed the day and year first above written.

SIGNED SEALED AND DELIVERED by the above-named Cecil Hanbury in the presence of :—
Arthur M. Hanbury, The Knoll, Penn, Bucks. Engineer.
Horace Hanbury, 5 Fenchurch Street. E.C. Merchants clerk.

CECIL HANBURY. (L.S)

SIGNED SEALED AND DELIVERED by the above-named Ellen Willmott in the presence of :—
Henry Benjamin May, Dysons Lane, Upper Edmonton. Nurseryman.
Henry Robert Hutchinson, 117 Victoria Street, S.W. Clerk, R.H.S.

ELLEN ANN WILLMOTT. (L.S)

SIGNED SEALED AND DELIVERED by the above named John Thomas Bennett-Poë in the presence of :—
Frank Reader, 117 Victoria St: S.W. Cashier, R.H.S.
Henry Robert Hutchinson, 117 Victoria St: S.W. Clerk, R.H.S.

J. T. BENNETT-POË. (L.S)

SIGNED SEALED AND DELIVERED by the above named Sir Thomas Hanbury in the presence of :—
Arthur M. Hanbury, The Knoll, Penn, Bucks. Engineer.
Horace Hanbury, 5 Fenchurch Street, E.C. Merchants clerk.

THOMAS HANBURY. (L.S)

SIGNED SEALED AND DELIVERED by the above named Sir James John Trevor Lawrence in the presence of :—
Harry J. Veitch, 34 Redcliffe Gardens, South Kensington, S.W. Gentleman.
F. G. Lloyd, Langley House, Langley, Bucks, Gentleman.

J. J. TREVOR LAWRENCE. (L.S)

SIGNED SEALED AND DELIVERED by the above named Joseph Gurney Fowler in the presence of :— J. GURNEY FOWLER. (L.S)

Harry J. Veitch, 34 Redcliffe Gardens, South Kensington, Gentleman.

F. G. Lloyd, Langley House, Langley, Bucks, Gentleman.

SIGNED SEALED AND DELIVERED by the above named Reverend William Wilks M.A. in the presence of :— W. WILKS. Sec : R.H.S. (L.S)

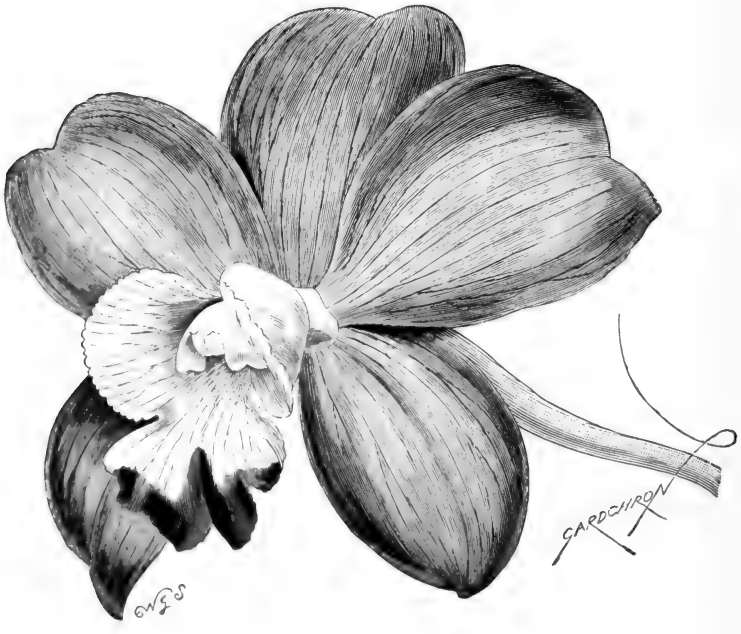
Harry J. Veitch, 34 Redcliffe Gardens, South Kensington. Gentleman.

F. G. Lloyd, Langley House, Langley, Bucks. Gentleman.

THE COMMON SEAL of THE ROYAL HORTICULTURAL SOCIETY was hereunto affixed in the presence of us the undersigned at a Meeting of the Council of the Society held on the 13th day of October 1903. (Society's Seal)

F. G. Lloyd. } Members of the Council.
W. Marshall. }

W. Wilks. Secretary.



REPORT ON THE METEOROLOGICAL OBSERVATIONS MADE IN THE SOCIETY'S GARDENS AT CHISWICK IN 1903.

By Edward Mawley, Past-President R.Met.Soc.

There has been no change during the year in the position of any of the instruments, and the readings have been taken regularly, as in the four previous years, by the observer, Mr. T. W. Turner, at 9 A.M. each day. After carefully checking the entries in the observation book and comparing all those which appeared in any way doubtful with similar observations made at other meteorological stations in the London district, it was found necessary to alter only four of the entries. In seven cases the columns of figures had been incorrectly added up, and in three cases the means had been incorrectly calculated. In June I tested all the thermometers, and where any slight changes had taken place in their readings since they were last examined, the corrections to be used in future by the observer were noted on their Kew certificates.

Note.—At the beginning of the present year (1904) all the meteorological instruments were moved to the Society's gardens at Wisley, and set up, under the direction of Mr. R. H. Curtis, F.R.Met.Soc., and myself, on an excellent site, within easy access of the cottage of the new observer, Mr. T. Frazer. To the instruments used at Chiswick have been added a Campbell-Stokes sunshine recorder and a self-registering Robinson anemometer. By the beginning of April this new meteorological station will be in good working order, and the observations from that time duly recorded.

A Brief Monthly Summary of the Observations taken in the Society's Gardens at Chiswick in 1903.

January.—Very warm and rather wet. The days were, as a rule, about 2 degrees warmer, and the nights about 3 degrees warmer, than is seasonable. On the coldest night the thermometer on the grass showed 16 degrees of frost.

The rainfall was rather heavy, being about half an inch in excess of the average quantity for the month.

Mean temperature of the air in shade	41°.2		
Highest „ „ „	58°.7	on the	5th
Lowest „ „ „	25°.8	„	16th
Lowest „ on the grass	15°.8	„	15th

	At 1 ft. deep	At 2 ft. deep.	At 4 ft deep.
Mean temperature of the soil at 9 a.m.	39°.6	42°.1	45°.1
Highest „ „ „	45°.3	45°.0	46°.8
Lowest „ „ „	33°.9	39°.0	43°.4

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 87

Rain fell on 16 days to the total depth of ... ... 2·18 ins.
(Equivalent to about 10 gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... ... 0·73 in. on the 4th

February.—Most exceptionally warm and very dry. The days were, as a rule, about 6 degrees warmer, and the nights about 5 degrees warmer, than is seasonable. On the coldest night the thermometer on the grass showed 20 degrees of frost.

The rainfall was very light, being about half an inch below the average quantity for the month.

Mean temperature of the air in shade			45°.2	
Highest " " "			59°.2	on the 20th
Lowest " " "			23°.1	" 18th
Lowest " on the grass			11°.6	" 18th
	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.	
Mean temperature of the soil at 9 a.m.	43°.4	44°.3	45°.3	
Highest " " "	46°.9	45°.8	45°.9	
Lowest " " "	38°.4	42°.0	44°.5	

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 83

Rain fell on 11 days to the total depth of ... ... 0·86 in.

(Equivalent to about 4 gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... ... 0·27 in. on the 27th

March.—Very warm and exceptionally wet. The days were, as a rule, about 4 degrees warmer, and the nights about 3 degrees warmer, than is seasonable. On the coldest night the thermometer on the grass showed 15 degrees of frost.

The rainfall was exceptionally heavy, being more than an inch in excess of the average quantity for the month.

Mean temperature of the air in shade			46°.3	
Highest " " "			68°.2	on the 25th
Lowest " " "			28°.2	" 12th
Lowest " on the grass			16°.6	" 12th
	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.	
Mean temperature of the soil at 9 a.m.	44°.6	45°.3	45°.9	
Highest " " "	49°.7	48°.0	47°.2	
Lowest " " "	40°.9	43°.7	45°.3	

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 78

Rain fell on as many as 20 days to the total depth ... ... 2·41 ins.

(Equivalent to about 11 gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... ... 0·35 in. on the 2nd

April.—Very cold and wet. The days were, as a rule, about 3 degrees colder, and the nights about 2 degrees colder, than is seasonable. On the coldest night the thermometer on the grass showed 20 degrees of frost.

The rainfall was heavy, being about half an inch in excess of the average quantity for the month.

Mean temperature of the air in shade			44°. 5	
Highest " " "			59°.4	on the 28th
Lowest " " "			28°.0	on the 16th and 19th
Lowest " on the grass			12°.3	on the 25th
	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.	
Mean temperature of the soil at 9 a.m.	45°.8	46°.7	47°.2	
Highest " " "	49°.8	47°.9	47°.7	
Lowest " " "	42°.8	45°.3	46°.7	

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 73
Rain fell on 12 days to the total depth of ... ... 1·85 ins.
(Equivalent to about 8½ gallons on each square yard of surface in the Gardens.)
Heaviest fall on any day ... ... 0·45 in. on the 28th

May.—Warm and exceptionally wet. The days were, as a rule, about 1 degree warmer, and the nights about 2 degrees warmer, than is seasonable. On the coldest night the thermometer on the grass showed 8 degrees of frost.

The rainfall was exceptionally heavy, being 1¼ in. in excess of the average quantity for the month.

Mean temperature of the air in shade	54°.0		
Highest ,, ,, ,, ...	77°.3	on the	22nd
Lowest ,, ,, ,, ...	32°.2	,,	13th
Lowest ,, on the grass	24°.0	,,	13th

	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	53°.7	52°.0	49°.8
Highest ,, ,, ,, ...	60°.0	56°.0	52°.7
Lowest ,, ,, ,, ...	50°.0	48°.2	47°.0

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 74
Rain fell on 17 days to the total depth of ... ... 3.24 ins.
(Equivalent to about 15 gallons on each square yard of surface in the Gardens.)
Heaviest fall on any day ... ... 0·93 in. on the 30th

June.—Very cold and most exceptionally wet. The days were, as a rule, about 4 degrees colder, and the nights about 2 degrees colder, than is seasonable. On the coldest night the thermometer on the grass showed 3 degrees of frost.

The rainfall was most exceptionally heavy, being more than three times the average quantity for the month.

Mean temperature of the air in shade	56°.6		
Highest ,, ,, ,, ...	84°.7	on the	28th
Lowest ,, ,, ,, ...	37°.8	,,	13th
Lowest ,, on the grass	29°.3	,,	13th

	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	58°.0	56°.4	53°.9
Highest ,, ,, ,, ...	66°.3	61°.3	55°.5
Lowest ,, ,, ,, ...	53°.0	54°.2	53°.0

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 71
Rain fell on 10 days to the total depth of ... ... 6·43 ins.
(Equivalent to about 30 gallons on each square yard of surface in the Gardens.)
Heaviest fall on any day ... ... 1·30 in. on the 13th

July.—Cold and exceptionally wet. The days were, as a rule, about 1 degree colder than the average, while the nights were of about a seasonable temperature. On the coldest night the thermometer on the grass showed 1 degree of frost.

The rainfall was exceptionally heavy, being nearly double the average quantity for the month.

Mean temperature of the air in shade	61°.7	
Highest „ „ „	85°.2	on the 11th
Lowest „ „ „	43°.0	„ 8th
Lowest „ on the grass	31°.0	„ 8th

	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	63°.4	61°.4	57°.8
Highest „ „ „	66°.9	62°.6	58°.4
Lowest „ „ „	61°.2	60°.6	55°.9

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 73

Rain fell on 14 days to the total depth of ... ... 3·95 ins.

(Equivalent to about 18½ gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... ... 1·20 in. on the 23rd

August.—Cold and exceptionally wet. The days were, as a rule, about 2 degrees colder, and the nights about 1 degree colder, than is seasonable. On the coldest night the thermometer on the grass fell to 34 degrees, or 2 degrees short of the freezing-point.

The rainfall was exceptionally heavy, being nearly double the average quantity for the month.

Mean temperature of the air in shade	60°.3	
Highest „ „ „	78°.2	on the 8th
Lowest „ „ „	42°.0	„ 23rd
Lowest „ on the grass	34°.4	„ 7th

	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	61°.8	61°.0	58°.8
Highest „ „ „	63°.8	61°.8	59°.1
Lowest „ „ „	58°.8	60°.2	58°.4

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 75

Rain fell on 17 days to the total depth of ... ... 4·02 ins.

(Equivalent to about 19 gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... ... 0·96 in. on the 24th

September.—Seasonable in temperature and wet. Both the days and nights were, as a rule, of about a seasonable temperature. On the coldest night the thermometer on the grass showed 3 degrees of frost.

The rainfall was heavy, being more than half an inch in excess of the average quantity for the month.

Mean temperature of the air in shade	58°.0	
Highest „ „ „	82°.2	on the 2nd
Lowest „ „ „	34°.9	„ 17th
Lowest „ on the grass	29°.0	„ 17th

	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	59°.2	59°.4	58°.4
Highest „ „ „	65°.2	62°.7	59°.7
Lowest „ „ „	53°.9	56°.7	57°.2

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 78

Rain fell on 12 days to the total depth of ... ... 3·14 ins.

(Equivalent to about 14½ gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... ... 1·39 in. on the 4th

October.—Very warm and most exceptionally wet. The days were, as a rule, about 3 degrees warmer, and the nights about 5 degrees warmer, than is seasonable. On the coldest night the thermometer on the grass showed 4 degrees of frost.

The rainfall was most exceptionally heavy, being more than double the average quantity for the month.

Mean temperature of the air in shade	53°.1		
Highest „ „ „	66°.0 on the 3rd		
Lowest „ „ „	35°.0 „ 24th		
Lowest „ on the grass	27°.5 on the 24th and 31st		
	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	54°.6	55°.9	56°.4
Highest „ „ „	59°.3	59°.3	57°.7
Lowest „ „ „	50°.0	53°.1	54°.4

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 86

Rain fell on as many as 25 days to the total depth of ... ... 5·33 ins.
(Equivalent to about 25 gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... ... 0·98 in. on the 11th

November.—Warm and rather dry. Both the days and nights were, as a rule, about 1 degree warmer than is seasonable. On the coldest night the thermometer on the grass showed 17 degrees of frost.

The rainfall was rather light, being nearly half an inch less than the average quantity for the month.

Mean temperature of the air in shade	44°.7		
Highest „ „ „	59°.8 on the 1st		
Lowest „ „ „	28°.0 „ 20th		
Lowest „ on the grass	14°.5 „ 20th		
	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	47°.1	49°.7	52°.1
Highest „ „ „	52°.0	52°.7	54°.4
Lowest „ „ „	42°.7	47°.3	50°.0

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 86

Rain fell on 13 days to the total depth of ... ... 1·67 ins.
(Equivalent to about 8 gallons on each square yard of surface in the Gardens.)

Heaviest fall on any day ... ... 0·72 in. on the 27th

December.—Seasonable in temperature and rainfall. The days were, as a rule, about 1 degree colder, and the nights about 1 degree warmer, than is seasonable. On the coldest night the thermometer on the grass showed 16 degrees of frost.

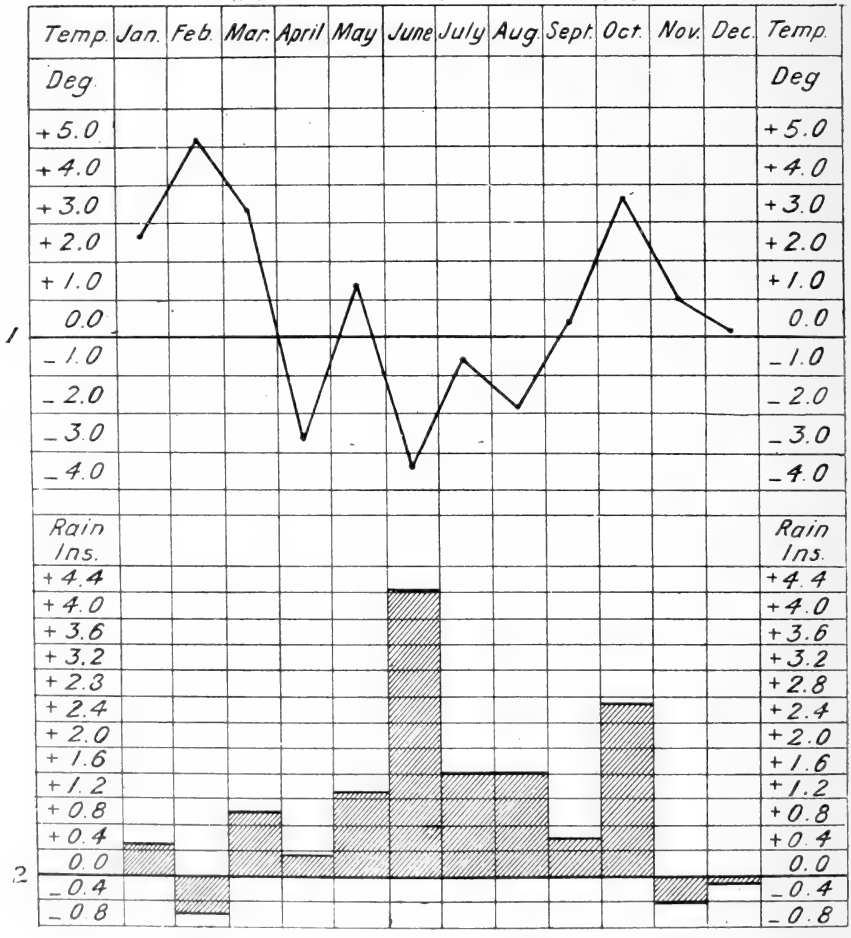
The rainfall was about average.

Mean temperature of the air in shade	39°.5		
Highest „ „ „	52°.6 on the 9th		
Lowest „ „ „	23°.8 „ 3rd		
Lowest „ on the grass	16°.3 „ 3rd		
	At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	41°.4	44°.4	47°.5
Highest „ „ „	44°.2	46°.8	49°.9
Lowest „ „ „	37°.3	41°.3	44°.4

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 88
Rain fell on 9 days to the total depth of ... ... 1·44 in.
(Equivalent to about 6½ gallons on each square yard of surface in the Gardens.)
Heaviest fall on any day ... ... 0·37 in. on the 10th

The Diagrams.—The averages with which the different mean monthly temperatures are compared in diagrams 1 and 2 are derived from the

DIAGRAM 1.—*Variation from the Average in Mean Temperature and Rainfall for each Month during the Year* 1903.



1. Average or seasonable Temperature. 2. Average or seasonable Rainfall.

FIG. 160.

observations taken at Kew Observatory during the twenty-five years ending 1895. The actual averages for Kew have not been used, but the departures in mean temperature, &c., from the monthly means for 1903 at that Observatory have been applied to the Chiswick temperatures; and in this way very close approximations to the true monthly averages have been obtained. Mr. Glaisher's discussion of the Chiswick temperatures,

1826–69 (referred to in Vol. xxiii. page 391), was not available for this purpose, as it gives no maxima or minima temperatures. The rainfall

DIAGRAM 2.—*Variation from the Average in the Mean Maxima and Mean Minima Temperatures of the Air for each Month during the Year* 1903.

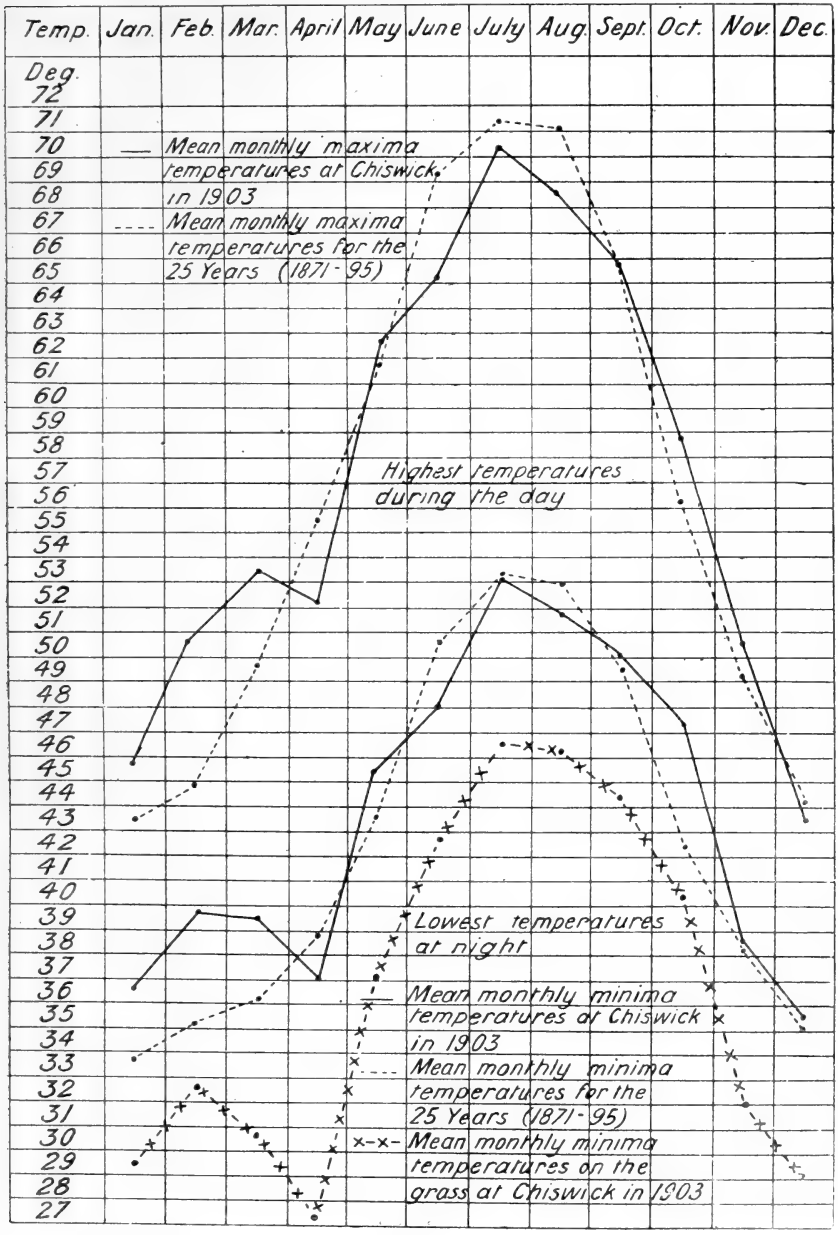


FIG. 161.

averages used in diagram 1 are, however, those given by Mr. Glaisher for the forty-four years ending 1869 at Chiswick.

Diagram 1.—This diagram (fig. 160) is intended to show at a glance the general character of the weather of each month of the year as regards temperature and rainfall. For instance, it will be at once seen how

DIAGRAM 3.—*Mean Temperature of the Air at Chiswick, compared with the Mean Temperature of the Soil at* 1 *ft.*, 2 *ft., and* 4 *ft. deep, for each Month during the Year* 1903, *taken at* 9 *a.m.*

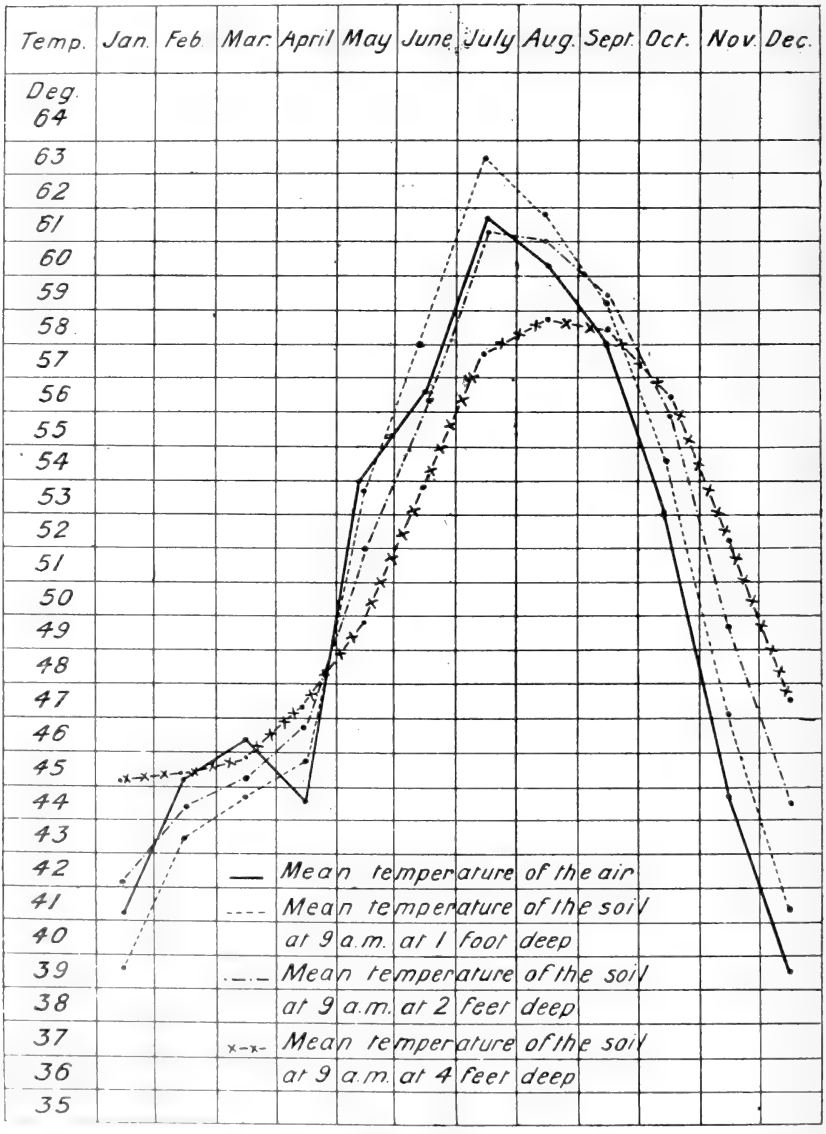


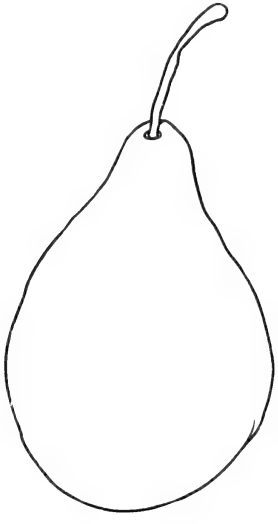
FIG. 162.

unseasonably warm were those months which may be termed the "winter" months, and on the other hand how persistently cold the weather continued during the greater part of the summer half of the year.

February was the most unseasonably warm and dry month, and June the most unseasonably cold and wet one. As affecting vegetation the most noteworthy features were the keen frosts of April, coming as they did after a warm and forward March; the three weeks of warm and very dry weather between midsummer and the middle of July; and the continuous and heavy rainfall in October.

Diagram 2.—The average April day is about 6 degrees warmer than an average day in March, while the nights are as a rule about 3 degrees warmer in the former month than in the latter. But in 1903 this order was reversed, for the April days were a degree colder and the nights 2 degrees colder than those in March (fig. 161). This will be seen in the sudden dip downwards of the two curves between March and April in the otherwise fairly regular advance in temperature between January and July. It will also be noticed that, whereas the days in June were 4 degrees colder than is seasonable, the nights were less than 3 degrees colder than the average. Then again in October, while the days were only 3 degrees warmer, the nights were as much as 5 degrees warmer than is seasonable.

Diagram 3.—The fall in the mean temperature of the air between March and April is very marked (fig. 162), but in the ground-temperature curves there is no such dip, although a certain deflection from the normal is evident in the case of the temperature curve for one foot deep. This is no doubt owing to the fact that the cold weather in April only set in shortly before the middle of that month, and there were several warm days at its close, so that there was not sufficient time for the temperatures at the other depths to be seriously affected. In the coldest month, December, the soil at four feet deep was, on an average, 8 degrees warmer than the air; at two feet deep 5 degrees warmer, and at one foot deep 2 degrees warmer than the air. In the warmest month, July, the soil at four feet deep was 4 degrees colder than the air, at two feet deep it was of nearly the same temperature as the air, but at one foot deep the soil was 2 degrees warmer than the air.



NOTE ON THE HAWAIIAN ISLANDS.

By the Rev. Canon Weymouth, of Honolulu.

At the present day the trees and plants peculiar to the Hawaiian Islands are found only in the interior forests. But in all the large towns may be seen fine specimens of the Bread-fruit tree, with its large, dark green leaves, pinnately lobed and affording dense shade, which is most desirable in a tropical land. Its green globular fruit, when properly cooked, is really delicious; but few people know the best method of preparing it for table.

There are about 140 native ferns in the Islands, few of which are ever seen in the populous districts. Many of the varieties are exceedingly beautiful. In the forests some of the tree ferns are at least ten inches in diameter and 16 to 20 feet in height. The Bird's-nest Fern has fronds 4 or 5 feet long, and 6 or 7 inches wide.

There are palms of several varieties, the most attractive being the Royal Palm, its erect stem being always smooth and graceful. At Lahaina, the well-known Cocoanut Palm, with its crooked trunk, splendid fronds and delicious fruit, sometimes reaches a height of 100 feet. Its waving plumes are a picturesque feature in the landscape.

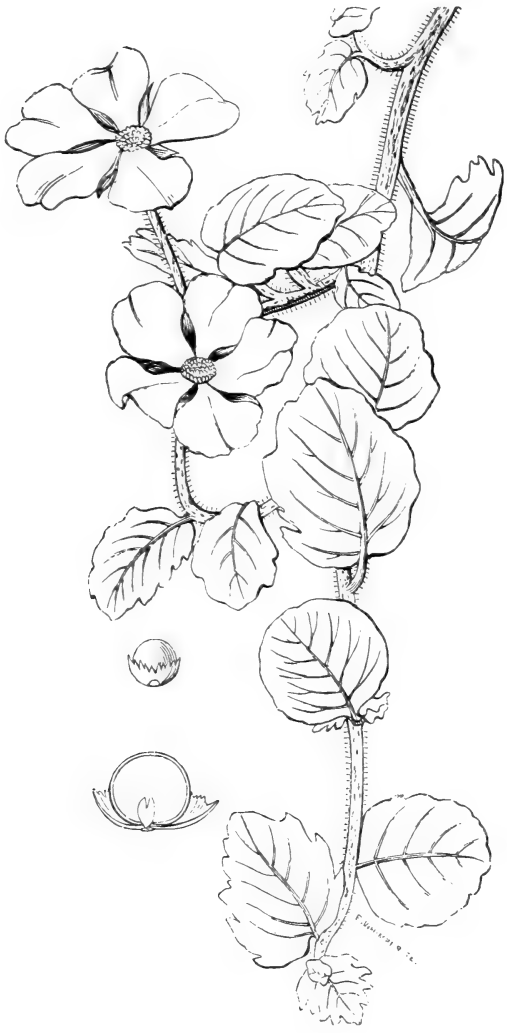
The palmately lobed leaves of the Papaya tree are 16 to 18 inches wide, on petioles 2 feet in length. The male tree bears spicy white blossoms, and the female produces a melon-like fruit 4 or 5 inches in diameter. The purple passion flowers of the Grenadilla are very beautiful, and its large pale green fruit has an agreeable flavour, reminding one of the Catawba grape. Another species of the passion flower bears a fruit which is commonly known as the sweet water lemon. The Monkey-pod tree, belonging to the Acacia group, bears a profusion of magnificent purple blossoms; its leaves are closely folded together at night.

The Ironwood tree, found in most of the tropical Pacific Islands, has singular foliage resembling the Pines, and a fruit similar to that of the Juniper. The South Sea Islanders formerly used its hard black wood to manufacture their war clubs and forks for cannibal orgies. The *Eugenia malaccensis*, or mountain apple, has large green, oval, lustrous leaves, scarlet blossoms, and a deep red fruit. The *Aleurites moluccana*, or Kukui tree, is noted for its silvery foliage and oily nuts as large as the English walnut. The natives formerly strung the kernels on bamboo splints and used them as torches. Black polished ornaments are made from the shells.

Bananas, of several varieties, are found everywhere in these Islands, and large quantities of the fruit are shipped to California. Mr. A. B. Lyons calls attention to a similar tree, sometimes known as the Bony Banana. In the sunshine its tough fruit "splits into three valves, which separate and re-curve, revealing one of Nature's marvels. Each valve is

found to hold two lines of seeds, each enveloped in a fantastic jacket of deep clear blue."

There are numerous varieties of the Mango in these Islands, and the fruit is always in demand. The Strawberry and Mandarin Guavas find a congenial home here, and a guava jelly factory will soon be built on the Island of Maui. Custard Apples, Alligator Pears, and many other fruits are often in the market. Strawberries may be seen every day in the year.



REPORT ON TOMATOS AT CHISWICK, 1903.

FIFTY-THREE stocks of Tomatos were received for trial in the Gardens. Two plants of each were grown and fruited in ten-inch pots under glass. The season was a very unfavourable one for Tomatos, but all made good growth, setting and swelling an average crop of fruit. The trial proved that there was no new variety of particular excellence. And again, so many varieties of Tomatos are so similar that only the slightest difference in form, colour, or growth distinguishes them from each other. The Committee examined the collection on two occasions.

F.C.C. = First-class Certificate.
A.M. = Award of Merit.

1. Advance (Laxton).—Flat round; large, bright red; usually smooth; solid; averaging four fruits in a cluster; short-jointed. Good crop.

2. Best of All (Sutton).—Round; medium size; deep red; smooth; solid; averaging five fruits in a cluster; short-jointed. Heavy crop.

3. Bouncer (Laxton).—Very similar to No. 41.

4. Bunn's Superlative (Bunn).—Deep round; medium size; smooth; solid; handsome; dark red; averaging six fruits in a cluster; short-jointed. Heavy crop.

5. Canary Isles (Carter).—Deep round; large; smooth; solid; deep red; averaging five fruits in a cluster; short-jointed. Heavy crop.

6. Chiswick Peach, **F.C.C.** August 15, 1899 (J. Veitch).—Round; smooth; skin lemon-yellow, covered with down like a Peach; solid; fine flavour; averaging six fruits in a cluster; short-jointed. Heavy crop.

7. Coronation (Parr).—Flat round; very large; slightly corrugated; solid; dark red; averaging five fruits in a cluster; short-jointed; heavy crop. The Committee considered this variety too large to be generally useful.

8. Cranford Prolific (Shawyer).—Very similar to No. 4.

9. Dwarf Gem (Sutton).—Deep round; medium size; smooth; solid; yellow; averaging four fruits in a cluster; short-jointed. Heavy crop.

10. Dyer's Seedling (Dyer).—See Vol. xxvii. p. 634.

11. Earliest of All (Sutton).—Flat round; medium size; usually smooth; dark red; solid; averaging three fruits in a cluster; short-jointed. Good crop.

12. Fame (Laxton).—Flat round; rather small; smooth; solid; bright red; averaging three fruits in a cluster; short-jointed. Fair crop.

13. First and Last (Sharpe).—Similar to No. 7.

14. Futurity 1901 (Holmes).—Deep round; small; smooth; solid; dark red; great trusses of 25 to 30 fruits in a cluster; short-jointed. Very heavy crop.

15. Futurity 1902 No. 6 (Holmes).—A larger-fruited and equally productive form of No. 14. This is a very promising variety, and if the fruit were only a little larger it would be a very valuable acquisition.

16. Futurity Improved 1901 (Holmes).—Pear-shaped; a larger form of *Semper fructifera*, with its immense cluster of fruit.

17. Futurity 1902 No. 1 (Holmes).—Round; small; smooth; solid; dark red; averaging eight fruits in a cluster; short-jointed. Good crop.

18. Golden Nugget, **F.C.C.** August 14, 1894 (Sutton).—Egg-shaped; small; smooth; handsome; solid; fine flavour; averaging 7 to 9 in a cluster; short-jointed. Heavy crop.

19. Hipper II. (Holmes).—Deep round; large; smooth; dark red; solid; averaging four fruits in a cluster; short-jointed. Heavy crop.

20. Holmes's Supreme (Hurst).—Round; medium size; smooth; solid; dark red; averaging seven fruits in a cluster; short-jointed. Heavy crop. A very good variety.

21. Invercargill Scarlet (Barr).—Deep round; medium size; smooth; solid; bright red; averaging four fruits in a cluster; short-jointed. Heavy crop.

22. Invercargill Pink (Barr).—A paler form of No. 21.

23. Invincible (Laxton).—See Vol. xxvii. p. 635.

24. Magnum Bonum (Sutton).—See Vol. xxvii. p. 635.

25. Marvel of the Market (Hurst).—Deep round; medium size; smooth; solid; dark red; handsome; averaging four fruits in a cluster; short-jointed. Heavy crop.

26. Mitchell's No. 2 (Dyer).—Very similar to No. 50.

27. New Coronation (Webb).—Same as King Humbert.

28. New No. 1 (Barr).—Same as No. 31.

29. New No. 2 (Barr).—Flat round; small; some smooth, others corrugated; dark scarlet; solid; averaging nine fruits in a cluster; short-jointed. Heavy crop. Requires further selection.

30. New No. 3 (Barr).—Flat round; large; smooth; solid; dark red; averaging four fruits in a cluster; short-jointed. Heavy crop.

31. Open Air (Sutton).—Flat; irregular in size; corrugated; averaging six fruits in a cluster; deep red; short-jointed. Heavy crop.

32. Out-of-Door (Sharpe).—Same as No. 31.

33. Peachblow (Sutton).—Deep round; large; smooth; solid; purplish-red; averaging four fruits in a cluster; short-jointed. Heavy crop.

34. Peerless (Sutton).—Deep round; smallish; smooth; dark red; fine flavour; averaging six fruits in a cluster; short-jointed. Heavy crop.

35, 36. Princess of Wales (Hurst, Sutton).—Flat round; rather large; smooth; solid; dark red; averaging eight fruits in a cluster; short-jointed. Heavy crop.

37. Queen of England (Hurst).—Deep round; medium size; usuall smooth; solid; dark red; averaging five fruits in a cluster; short-joint Heavy crop.

38. Reliance (Sharpe).—Very similar to No. 37.

39. Rival (Laxton).—Round; medium size; smooth; solid; deep red; averaging four fruits in a cluster; short-jointed. Good crop.

40. Rosy Gem (Hogg & Robertson).—Deep round; small; smooth; solid; skin rosy-purple and covered with down; averaging six fruits in a cluster; short-jointed. Heavy crop. A form of the Peach Tomato.

41. Satisfaction (Sutton).—Flat round; large; smooth; solid; dark red; averaging four fruits in a cluster; short-jointed. Heavy crop.

42. Shilling's King (Hurst).—Very similar to No. 13.

43. Sunbeam (Sutton).—See Vol. xxvii. p. 636.

44. Superb (Laxton).—See Vol. xxvii. p. 636.

45. Sutton's A 1 (Sutton).—Deep round; large; smooth; solid; averaging four fruits in a cluster; deep red; short-jointed. Heavy crop.

46. The Doyle (Hurst).—Round; large; smooth; solid; dark red; averaging four fruits in a cluster; short-jointed. Good crop.

47. The King (Hurst).—A more prolific form of No. 46.

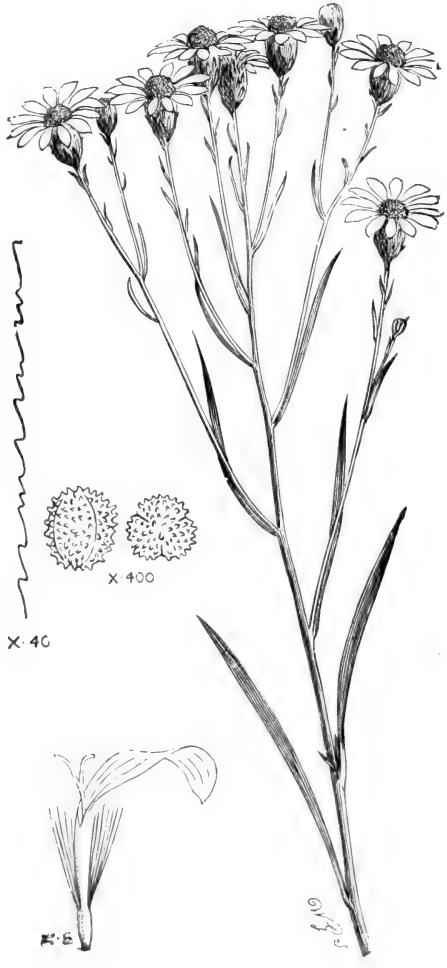
48. The Peer (Thomas).—Same as No. 31.

49. Twentieth Century (Hogg & Robertson).—Very similar to No. 46.

50. Up-to-Date (Sharpe).—Flat round; medium size; smooth; solid; bright red; averaging six fruits in a cluster; short-jointed. Heavy crop.

51. Veitch's Glory (R. Veitch).—See Vol. xxvii. p. 637.

52, 53. Winter Beauty, **A.M.** April 18, 1899 (Barr, Sutton).—See Vol. xxvii. p. 637.



REPORT ON POTATOS AT CHISWICK, 1903.

EIGHTY-SEVEN stocks of new and old varieties of Potatos were sent for trial in the Gardens. The collection (with a few exceptions, sent late) was planted on April 8, in rows three feet apart, and the "sets" eighteen inches apart in the rows, on ground that had been well manured and ridge-trenched the previous autumn. In spite of the wet, cold season, and of the fact that all the plants were frosted in the middle of June, most of them made excellent growth, and produced very good crops. Disease was more prevalent than for many previous seasons. The Fruit and Vegetable Committee met twice to examine the collection, and by reason of their heavy crop, good appearance, and freedom from disease, they ordered the following varieties to be cooked for the purpose of testing their quality, viz. :

Alpha	Duncraig Castle
Beauty of Bute	Gem
Bountiful	Giant Pink Kidney
Britannia	Green's Seedling
British Queen	Harrison's Prelude
Cole's Favourite	Henry Fincham
Daniels' Distinction	Leader
Daniels' Special	Lim Gray
Dalmeny Beauty	Maid of Coil
Discovery	Sunlight

Sir John Llewelyn.

F.C.C. = First-class Certificate.
A.M. = Award of Merit.

1. Abundance (Carew).—Kidney; white; russety; eyes full; medium size; good crop, free from disease; short, sturdy haulm. Late.

2. Alderman (Sharpe).—Kidney; white; russety; eyes shallow; medium size; good crop, slightly diseased; tall, strong haulm. Early.

3. Alpha, **A.M.** July 28, 1903 (Thomas).—Kidney; white; eyes full, handsome; medium size; heavy crop, free from disease; short, sturdy haulm. Mid-season.

4. Alpha (Dobbie).—This is distinct from No. 3, being flat, round, and earlier than No. 3; white; eyes shallow; russety; good crop, slightly diseased. Early.

5. Annie Atkinson (Atkinson).—Flattish oval; white; eyes shallow; medium to large in size; heavy crop, diseased; tall, strong haulm. Late.

6, 7. Beauty of Bute (Hurst, Carew).—Round; white; russety; eyes rather deep; medium size, handsome; very heavy crop, free from disease; tall, strong haulm. Late.

8. Bond's Unique (Bond).—Red. The whole crop was diseased.

9. Bountiful (Carew).—This is quite distinct from 'Bountiful' sent by Mr. Fenn in 1874, which had a **F.C.C.** September 10 of that year, and was a red-skinned variety. No. 9 is a round white, very large, with shallow eyes; tall, strong haulm; free from disease. Late.

10. Britannia (Carew).—Round; white; eyes shallow; great crop of small tubers, free from disease; tall, strong haulm. Late.

11. British Queen (Carew). Round; white; eyes shallow; very uneven in size; heavy crop, slightly diseased; tall, strong haulm. Mid-season.

12. Champion II. (Hogg & Robertson).—An improved form of the old 'Champion'; good crop, free from disease. Late.

13. Cole's Favourite, **F.C.C.** August 20, 1885 (Carew).—Pebble shape; white; russety; eyes full; medium size; heavy crop, free from disease; tall, strong haulm. Late.

14. Come to Stay (Carew).—Round; white; eyes shallow; small; good crop, slightly diseased; tall, sturdy haulm. Late.

15. Dalmeny Beauty, **A.M.** September 11, 1903 (Smith). Round, or flat oval; white; eyes shallow; handsome; very heavy crop, free from disease; tall sturdy haulm. Late. For two years this variety has proved one of the best tried at Chiswick.

16. Daniels' Distinction (Daniels).—Round; white; russety; eyes shallow; medium size; heavy crop, free from disease; moderate, sturdy haulm. Mid-season or late.

17. Daniels' Special, **F.C.C.** September 25, 1894 (Carew). Round; white; eyes shallow; medium to large in size; handsome; very heavy crop, free from disease; tall, strong haulm. Late. When cooked this variety was excellent.

18. Dean's No. 1 (Hurst).—Small and much diseased.

19. Dean's Round Early (Hurst).—The whole crop was diseased.

20. Discovery (Sutton).—Round or flattish; white; eyes shallow; medium to large in size; very heavy crop, averaging 41 tubers to the root, free from disease; tall, strong haulm. Late.

21. Dobbie's Favourite (Dobbie).—See Vol. xxvii. page 654.

22. Duncraig Castle (Morrison).—Oval round; white; russety; eyes shallow; very heavy crop of large tubers, free from disease; tall, strong haulm. Late.

23. Duke of Rothesay (Hurst).—Flat oval; white; russety; eyes shallow; medium to large in size; heavy crop, slightly diseased; tall, robust haulm. Late.

24. Drummond's New Century (Carew).—Round; white; eyes rather deep; medium size; good crop, free from disease; tall haulm. Late. This variety is distinct from 'New Century' which Messrs. Dicksons sent last year for trial, and received **A.M.** August 14, 1902. The latter is a kidney shape, and an excellent early variety.

25. Early Lincoln (Cooper, Tabor).—Kidney; white; russety; handsome; eyes shallow; enormous crop of large tubers, slightly diseased; moderate, sturdy haulm. Early. A very promising variety.

26. Early Market (Coleman).—Kidney; white; eyes full; medium size; good crop, diseased; short haulm. Early.

27. Early Pink (Coleman).—Light crop, and all diseased.

28. Early Perfection (R. Veitch).—Round; pale pink; eyes full; medium size; good crop, slightly diseased; short haulm. Early.

29. Early Ensign Ragley (Cooper, Tabor).—Flat oval; white; russety; eyes full; medium size; heavy crop, slightly diseased; tall, strong haulm. Early.

30. Earl Roberts (Bradley).—See Vol. xxvii. page 654.

31. East Kent (Coleman).—Flat oval; white; eyes full; very large; heavy crop, free from disease; tall, strong haulm. Late.

32. Ellington's Pride (Ellington).—Flat oval; white; eyes shallow; medium size; heavy crop, much diseased; tall haulm. Late. Received late.

33. Ensign Ragley (Coleman).—See No. 29.

34. Evergood (Harrison)—Round; white; eyes full; medium size; handsome; heavy crop, free from disease; moderate haulm. Mid-season or late.

35. Expectation (Wiles).—Kidney; white; eyes full; medium size; heavy crop, free from disease; tall, strong haulm. Late.

36. Gem, **A.M.** July 28, 1903 (Wythes).—Roundish oval; white, russety; eyes shallow; medium size; very heavy crop, free from disease; tall, strong haulm. Mid-season.

37. General Buller, **A.M.** October 1, 1901 (R. Veitch).—See Vol. xxv. page 379.

38. Giant Pink Kidney (Hurst).—Kidney; deep pink; eyes full; medium size; good crop; slightly diseased; moderate haulm. Early.

39. Green's Seedling (Sowman).—All the crop diseased.

40. Harrison's Short-top (Harrison).—All the crop diseased.

41. Henry Fincham, **A.M.** September 11, 1903 (Fincham).—Flat oval; white; russety; eyes shallow; handsome; medium size; heavy crop, free from disease; tall, strong haulm. Late.

42. Her Majesty (Carew).—Round; white; eyes deep; uneven in size; heavy crop, free from disease; tall, strong haulm. Late.

43. Ideal (Harrison).—Pebble shape; white, russety; eyes full; medium size; fair crop, free from disease; short haulm. Early.

44. International (Carew).—This is probably the most handsome white kidney grown, but the quality is usually so poor that it is not worth growing.

45. Kentish Glory (Wiles).—Flat round; white; russety; eyes full; medium size; good crop, free from disease; short, sturdy haulm. Second early or mid-season.

46, 47. (Dobbie, Harrison).—Kidney, but variable in shape; white, slightly flushed with pink; eyes shallow; medium size; very heavy crop, free from disease; tall, strong haulm. Late.

48. La Mancha (Hogg & Robertson).—Round; pale purple; eyes shallow; small; light crop, slightly diseased; short haulm. Early.

49. Leader (Booth).—Oval; white; eyes full; medium size; light crop, diseased; short haulm. Early.

50. Leicester Prolific (Harrison).—Pebble shape; white; eyes full; medium size; good crop, free from disease; moderate haulm. Early or mid-season.

51. Lim Gray, **F.C.C.** September 11, 1903 (Carew).—Round; white;

russety; eyes shallow; medium size; handsome; very heavy crop, free from disease; moderate sturdy haulms. Late. This variety was of very superior quality when cooked.

52. May Duke (Wythes).—Round to oval; very variable in shape and size; eyes shallow; much diseased; short haulm. Early.

53. Maincrop (Carew).—Round to oval; white; russety; eyes shallow; medium size, fair crop, free from disease; tall strong haulm. Mid-season or late. Distinct from Maincrop Kidney.

54. Maid of Coil, **A.M.** September 11, 1903 (Carew).—Flattish round; white; eyes shallow; large; handsome; very heavy crop, free from disease; tall, strong haulm. Late.

55. Monarch (Carew).—Round; white; russety; eyes shallow very variable in size; heavy crop, free from disease; tall, strong haulm. Mid-season or late.

56. Prima Donna (Bond).—Kidney; white; eyes shallow; medium size; good shape; very heavy crop; slightly diseased; short haulm. Very early.

57. Prime Minister (Carew).—Round; white; russety; eyes full; large; heavy crop, slightly diseased; tall, strong haulm. Late.

58. Prelude (Harrison).—Flat round; white; russety; eyes full; handsome; large; heavy crop, free from disease; tall, strong haulm. Late. A very promising variety.

59. Pride (Harrison).—Pebble shape; white; russety; eyes full; medium size; good shape; heavy crop, free from disease; short, sturdy haulm. Early.

60. Pride of the Garden (Wiles).—All the tubers were very small and much diseased.

61. Racehorse (Carew).—Kidney; white; eyes full; small light crop, much diseased; short haulm. Early.

62. Red Cap (Carew).—Round; red; eyes deep; medium size; great crop, slightly diseased; tall, strong haulm. Late.

63. Reliance (Carew).—Usually kidney, but very variable in shape; russety; white; eyes shallow; large; heavy crop, free from disease; moderate, sturdy haulm. Mid-season.

64. Royal Table King (Carew).—Flat round; white; eyes shallow; large; handsome; heavy crop, free from disease; tall, strong haulm. Late.

65. Salmon Early Brooklyn (Atkinson).—Variable in shape; pale pink; eyes shallow; medium size; light crop, much diseased; short haulm. Early.

66. Saunders' Success (Saunders).—Round; white; russety; eyes rather deep; heavy crop, free from disease; tall, strong haulm. Late.

67. Schoolmaster (Carew).—Round; white; very russety; eyes shallow; heavy crop, free from disease; moderate haulm. Mid-season.

68. Scarlett's Flourball (Scarlett).—Round; white; the whole crop diseased.

69. Scarlett's Late Kidney (Scarlett).—Flat kidney; white; russety; eyes full; uneven in size; heavy crop, free from disease; tall, strong haulm. Late.

70. Scarlett's Mid-season (Scarlett).—Flat round; white; russety; eyes

shallow; very heavy crop, slightly diseased; tall, strong haulm. Mid-season or late.

71. Scarlett's Prolific (Scarlett).—Round; white; eyes deep; small; heavy crop, slightly diseased; exceptionally tall, strong haulm. Late.

72. Scarlett's White Blossom (Scarlett).—Round; white; eyes shallow; medium size; very heavy crop, much diseased; tall, strong haulm. Late.

73. Sir John Llewelyn, **A.M.** September 11, 1900 (Hurst).—Kidney; white; eyes full; medium size; handsome; very heavy crop, free from disease; moderate, sturdy haulm. Early or mid-season.

74. Snowdrift (Carew).—Variable in shape; white; eyes shallow; medium size; handsome; heavy crop, free from disease; tall, strong haulm. Late.

75. Sunlight, **A.M.** July 28, 1903 (Titterington).—Kidney; white; eyes full; good shape; medium size; very heavy crop, free from disease; short, sturdy haulm. Early.

76. Springfield (Dobbie).—See Vol. xxvii. page 654.

77. The Cottager (Laxton).
78. The Doctor (Laxton).
79. The Farmer (Laxton).
80. The Parson (Laxton).

These were received late and were not a success.

81. The Gorton (Carew).—Round; white; eyes shallow; good shape; medium size; very heavy crop, free from disease; tall, strong haulm. Late.

82. The Marfield (Bristow).—See Vol. xxvii. page 655.

83. The Crofter (Dobbie).—Round; white; eyes shallow; medium size; handsome; heavy crop, free from disease; moderate, sturdy haulm. Late.

84. The Sherwood (Clark).—Flat oval; white; russety; eyes full; handsome; large; good crop, free from disease; tall, strong haulm. Late.

85. The Cornishman (Bache).—Kidney; white; eyes shallow; uneven in size; good crop, free from disease; tall, strong haulm. Mid-season.

86. The Worcester (Wythes).—Kidney; white; russety; eyes full; medium size; light crop, free from disease; moderate haulm. Mid-season.

87. Wonderful Red (Scarlett).—Very similar to No. 38.

CACTUS DAHLIAS AT CHISWICK, 1903.

A COLLECTION of 90 stocks was received, most of which arrived the third week in June, and were planted immediately. Owing to the coldness of the season and the excessive moisture, the plants did not start into growth with the vigour that they would have in a more favourable season; many of them were very late in flowering, and consequently only carried small blooms. The Floral Committee examined the collection on three occasions. The trial will be continued in 1904, at Wisley.

A.M. = Award of Merit.
× × × = Highly Commended.

1. Alfred Vasey, × × × September 21, 1900 (Keynes Williams).—Of medium height; bushy habit; free-flowering; stems long and stiff; petals broad and reflexed; bright salmon.

2. Alpha, **A.M.** September 10, 1901 (Hobbies, Dobbie).—Tall, slender habit; free-flowering; flower-stems long and drooping; petals broad and reflexed; white, streaked and spotted with purple.

3. Arab (Dobbie).—Tall, bushy habit; free-flowering; flowers large; petals broad and reflexed, stems long and stiff; crimson.

4. Aunt Chloe (Dobbie, Hobbies).—Dwarf, bushy habit; flowers on long stiff stems and thrown well above the foliage; petals long, narrow, and incurving; deep crimson.

5. Britannia, × × × September 21, 1900 (Hobbies, Keynes Williams).—Medium height; bushy habit; stems long and erect; flowers large and well above the foliage; petals broad and slightly incurved; salmon.

6. Canary (Dobbie).—Tall, bushy habit; stems long and erect; flowers large and well above the foliage; petals long, broad, and reflexed; canary-yellow.

7. C. G. Stredwick (Hobbies, Dobbie).—Dwarf, bushy habit; stems short, and flowers partly hidden by the foliage; flowers large; petals long and narrow, reflexed; buff tinged with rose.

8. Cheal's White (Cheal).—Medium height; bushy habit; stems long and drooping; free, flowers medium size; petals broad and reflexed; pure white.

9. Clio, **A.M.** September 24, 1901 (Hobbies, Dobbie).—Medium height; bushy habit; stems long and erect; flowers not large but well above the foliage; petals long, narrow, and incurving; buff, suffused with rose.

10. Columbia (Hobbies).—Medium height; bushy habit; stems long and erect; flowers large, and well above the foliage; petals long and very much incurved; soft crimson, heavily tipped with pure white.

11. Coronation, **A.M.** September 23, 1902 (Keynes Williams).—Medium height; bushy habit; stems long and erect; flowers large and well above the foliage; petals narrow and reflexed; scarlet.

12. Countess of Hopetoun (Dobbie).—Medium height; bushy habit;

stems long and erect; flowers large and well above the foliage; petals long, broad, and reflexed; pure white.

13. Countess of Lonsdale, **A.M.** September 20, 1898 (Keynes Williams).—Dwarf, bushy habit; stems long and erect; flowers large and well above the foliage; petals long, broad, and reflexed; salmon-pink.

14. Duc d'Orléans (Dobbie).—Dwarf, bushy habit; stems short; flowers large, but partly hidden by the foliage; petals broad and reflexed; white, splashed and spotted with purple.

15. Edith Champneys (Champneys).—Medium height; bushy habit; long and erect stems; flowers large and well above the foliage; petals long, broad, and reflexed; crimson, base of petals yellow.

16. Edith Walters (Dobbie).—Medium height; bushy habit; stems short and erect; flowers large; petals long, narrow, and incurved; rosy-purple.

17. Flamingo (Hobbies).—Tall, bushy habit; stems long and erect; flowers large; petals long, broad, and slightly incurved; bright scarlet.

18. Florence (Hobbies, Dobbie).—Medium height; bushy habit; stems long and drooping; flowers large; petals long, narrow, and incurved; buff, tinged with rose.

19. Floradora (Hobbies).—Dwarf, bushy habit; stems long and erect; free-flowering; flowers of medium size, with broad and slightly incurved petals; deep crimson.

20. Freedom, **A.M.** September 10, 1901 (Cheal).—Tall, bushy habit; stem short and weak; free-flowering; flowers medium size; petals narrow and reflexed; rosy-scarlet.

21. Florrie Tranter (Mortimer).—Medium height; bushy habit; stems long and erect; flowers large; petals long, narrow, and incurved; soft crimson.

22. Gabriel, **A.M.** September 10, 1901 (Dobbie, Keynes Williams, Hobbies).—Medium height; stems long and erect; free-flowering; flowers large, with long narrow, petals much incurved; soft crimson, heavily tipped with pure white.

23. Garden Cactus Magenta Pink (Hobbies).—Dwarf, bushy habit; short stems; moderately free-flowering; flowers large; petals broad and slightly incurved; magenta, tipped with light purple.

24. Garden Cactus Yellow (Hobbies).—Medium height; bushy habit; stems short; free-flowering; medium-sized flowers; petals broad and slightly incurved; yellow, tinged with red.

25. Goldfinch, **A.M.** September 24, 1901 (Dobbie).—Medium height; bushy habit; stems long and erect; moderately free-flowering; flowers large; petals long, broad, and incurved; golden-yellow.

26. Hetty Dean (Hobbies).—Medium height; bushy habit; stems slender and drooping; free-flowering; flowers large; petals long, narrow, and slightly incurved; buff, tinged with rose.

27. Honeysuckle (Hobbies).—Medium height; bushy habit; free-flowering; flowers small; petals twisted and incurved; buff, reverse rose.

28. Imperator (Hobbies).—Tall, bushy habit; stems long and erect; free-flowering; flowers large; petals long, broad, and incurved; red, semi-double, showing yellow disc.

29. J. H. Hudson (Cheal).—Medium height; bushy habit; stems

long and erect; free-flowering; flowers large; petals long, narrow, and incurved; buff, tinted with rose.

30. J. H. Jackson (Hobbies, Dobbie).—Medium height; bushy habit; stems long and erect; very free-flowering; flowers large; petals long and slightly incurved; very deep crimson.

31. John Burns (Hobbies).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals broad and reflexed; crimson.

32. J. W. Wilkinson (Hobbies).—Medium height; bushy habit; free-flowering; flowers large; stems long and slender; petals long and slightly incurved; crimson, tipped with purple.

33. J. Weir Fife (Hobbies).—Dwarf, bushy habit; stems slender and drooping; moderately free-flowering; flowers large; petals long, broad, and slightly incurved; crimson, touched with purple.

34. King of Siam (Cheal).—Medium height; bushy habit; stems long and erect; medium-sized flowers; petals broad and reflexed; deep crimson.

35. Liberty (Hobbies).—Medium height; bushy habit; stems short and drooping; moderately free-flowering; medium-sized flowers; petals long, narrow, and slightly incurved; crimson.

36. Lord Alverstone (Cheal).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals broad and reflexed; rosy-scarlet, tipped with purple.

37. Lord Brassey (Hobbies).—Tall, bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and incurved; rosy-purple, with yellow centre.

38. Lord Roberts (Hobbies).—Tall, rather slender habit; free-flowering; medium-sized flowers; petals long and incurved; creamy-white, touched with green in the centre.

39. Loogalu (Hobbies).—Dwarf, bushy habit; stems long and drooping; free-flowering; flowers large; petals broad and reflexed; orange-red.

40. Lottie Dean (Dobbie, Hobbies).—Medium height; bushy habit; stems long and drooping; free-flowering; flowers large; petals long and slightly incurved; buff, streaked and tinted with rose.

41. Lucifer (Dobbie).—Tall, bushy habit; stems long and drooping; free-flowering; flowers large; petals long, narrow, and incurved; orange-scarlet.

42. Mabel Needs (Mortimer).—Dwarf, bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and incurved; rosy-scarlet.

43. Magnificent (Hobbies).—Dwarf habit; rather slender growth; stems long and drooping; free-flowering; flowers large; petals long, narrow, and reflexed; buff, with centre of flower and tips of petals rose.

44. Manxman, **A.M.** September 23, 1902 (Mortimer).—Medium height; bushy habit; free-flowering; flowers large; stems long and erect; petals long, narrow, and incurved; rosy-scarlet, touched with light purple.

45. Mary (Treseder).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and reflexed; crimson, base of petals yellow.

46. Mary Service, **A.M.** September 21, 1897 (Keynes Williams).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals broad and reflexed; salmon-pink.

47. Meteor (Mortimer).—Dwarf, bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and incurved; soft crimson, tipped with purple.

48. Mr. A. F. Perkins. **A.M.** September 24, 1901 (Cheal, Hobbies).—Medium height; bushy habit; stems long and erect; free-flowering; flowers, large; petals long, narrow, and slightly incurved; sulphur-yellow, tipped with pure white.

49. Mrs. Amos Perry, **A.M.** September 29, 1903 (Hobbies).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals long, broad, and very much incurved; bright scarlet.

50. Miss Finch (Cheal).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals broad and reflexed; purple.

51. Miss Winchester (Dobbie).—Medium height; bushy habit; stems long and erect; free-flowering; petals long, narrow, and incurved; salmon, tipped with light purple.

52. Miss Winstanley (Dobbie, Hobbies).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and incurved; scarlet, with yellow centre.

53. Mrs. C. Mortimer (Cheal).—Medium height; bushy habit; free-flowering; flowers large; stems long and erect; petals long, narrow, and incurved; rosy-buff, shading to light purple at the tips of petals.

54. Mrs. Clinton (Mortimer).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and incurved; salmon.

55. Mrs. De Lucca, **A.M.** September 10, 1901 (Cheal).—Tall, bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and incurved; lemon-yellow.

56. Mrs. E. Mawley, **A.M.** September 24, 1901 (Dobbie, Hobbies).—Tall, bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and incurved; deep yellow.

57. Mrs. E. T. Powell (Cheal).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals broad and reflexed; pale yellow, with large yellow disc.

58. Mrs. F. Goddard (Cheal).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals broad and reflexed; crimson.

59. Mrs. Forwood (Cheal).—Tall, bushy habit; stems long and drooping; petals long, narrow, and incurved; buff, tipped and shaded with rose.

60. Mrs. G. Cooke (Hobbies).—Medium height; bushy habit; stems slender and drooping; free-flowering; medium-sized flowers; petals broad and incurved; rosy-purple, with nearly white centre.

61. Mrs. Gunther (Cheal).—Dwarf, bushy habit; stems long and erect; free-flowering; flowers large; petals long, broad, and reflexed; rosy-purple, with pale centre.

62. Mrs. H. A. Needs (Dobbie).—Medium height; bushy habit; stems

long and erect; free-flowering; flowers large; petals long, narrow, and incurved; bright rosy-crimson.

63. Mrs. H. J. Jones, **A.M.** September 10, 1901 (Hobbies, Dobbie).—Medium height; slender habit; stems long and erect; free-flowering; flowers large; petals long, broad, and slightly incurved; crimson, heavily tipped with pure white.

64. Mrs. Hobart (Cheal).—Dwarf, bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and reflexed; buff.

65. Mrs. John Barker (Mortimer).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and incurved; soft salmon.

66. Mrs. J. P. Clarke (Hobbies).—Tall, slender habit; long, drooping stems; free-flowering; flowers large; petals broad, slightly incurved; orange-red, tipped with light purple.

67. Mrs. McKergow (Cheal).—Dwarf, bushy habit; stems long and erect; free-flowering; flowers large; petals broad and reflexed; buff, with warm coloured centre.

68. Mrs. Spencer Castle (Mortimer).—Dwarf bushy habit; stems long and erect; free-flowering; flowers large; petals broad and reflexed; buff shaded with purple.

69. Mrs. W. Cash (Cheal).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and slightly incurved; lemon-yellow.

70. Ophir, **A.M.** September 10, 1901 (Dobbie, Hobbies).—Dwarf, bushy habit; stems short and erect; free-flowering; flowers medium size; petals narrow and incurved; lemon-yellow.

71. Peace (Keynes Williams).—Medium height; bushy habit; stems long and erect; free-flowering; flowers medium size; petals broad and reflexed; pure white.

72. Primrose (Cheal).—Dwarf, bushy habit; stems long and erect; very free-flowering; flowers large; petals broad and reflexed; pale yellow

73. Prince of Yellows, **A.M.** September 25, 1900 (Hobbies).—Medium height; bushy habit; stems long and erect; free-flowering; flowers medium size; petals broad and slightly incurved; deep crimson.

74. Profusion, × × × September 21, 1900 (Cheal).—Dwarf, bushy habit; stems long and erect; free-flowering; flowers medium size; petals broad and reflexed; purple.

75. P. W. Tullock (Hobbies, Dobbie).—Medium height; bushy habit; stems long and erect; free-flowering; medium-sized flowers; petals long, narrow, incurved; salmon, tipped and shaded purple.

76. Red Cap (Hobbies).—Medium height; bushy habit; stems long and erect; moderately free-flowering; flowers medium size; petals nicely incurved; bright scarlet.

77. Red Rover, **A.M.** September 12, 1899 (Hobbies).—Tall, bushy habit; stems long and erect; free-flowering; flowers large; petals broad and slightly incurved; rich crimson.

78. Richard Dean, **A.M.** September 10, 1901 (Hobbies, Dobbie).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals broad and reflexed; scarlet, tipped with white.

79. Ring Dove, **A.M.** September 24, 1901 (Dobbie).—Medium height; bushy habit; stems rather short, but stiff and erect; free-flowering; flowers large; petals long, broad, and reflexed; pink, base of petals buff.

80. R. Needham (Treseder).—Medium height; bushy habit; stems long and erect; free-flowering; flowers medium size; petals broad and reflexed; crimson.

81. Rufus (Dobbie).—Tall, bushy habit; stems long and erect; free-flowering; flowers large; petals broad and tapering, reflexed; bright scarlet.

82. Sailor Prince, **A.M.** September 24, 1901 (Hobbies).—Tall, vigorous habit; free-flowering; flowers large; stems long and drooping; petals broad and slightly incurved; orange-red.

83. Sea Queen (Hobbies).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals broad and reflexed; orange-red, tipped and shaded purple.

84. Snowdrift (Dobbie).—Medium height; bushy habit; stems short and erect; free-flowering; flowers large; petals broad and slightly incurved; pure white.

85. Spitfire, **A.M.** September 29, 1903 (Dobbie).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals long, broad, and incurved; bright scarlet.

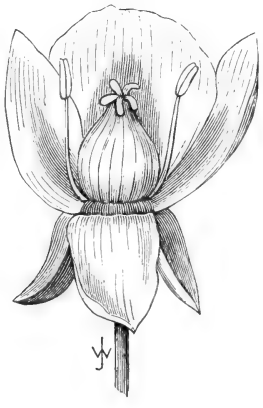
86. Spotless Queen, **A.M.** September 29, 1903 (Dobbie, Hobbies).—Dwarf, bushy habit; stems short and erect; free-flowering; flowers large; petals broad and reflexed; pure white.

87. Stella (R.H.S.).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals broad and reflexed; purple.

88. W. Cuthbertson, × × × September 21, 1900 (Hobbies).—Medium height; bushy habit; stems long and erect; free-flowering; flowers medium size; petals broad and very slightly incurved; crimson, tipped with light purple.

89. Winsome, **A.M.** September 23, 1902 (Hobbies).—Medium height; bushy habit; stems long and erect; free-flowering; flowers large; petals long, narrow, and incurved; creamy-white.

90. Zephyr (Hobbies).—Tall, bushy habit; stems long and drooping; free-flowering; large flowers; petals long and narrow; rosy-purple.



MISCELLANEOUS PLANTS GROWN FOR TRIAL AT CHISWICK, 1903.

ANTIRRHINUMS:—Plants received in spring.

1. Arthur Melville (Forbes).—Medium height; orange, flaked bright crimson.
2. Archie A. Oliver (Forbes).—Good habit; golden-yellow, flaked crimson.
3. A. Rennie (Forbes).—White, flaked purplish-crimson.
4. Aurora (Forbes).—White, flaked light crimson.
5. Brilliant (Forbes).—Orange, flaked and mottled blood-red.
6. Coronation (Forbes).—Flaked and mottled purple-crimson.
7. Distinction (Forbes).—Orange mouth, flaked and mottled crimson.
8. Gazelle (Forbes).—Lemon, slightly flaked crimson.
9. Hendersoni (Forbes).—White, striped carmine.
10. James Ewart (Forbes).—White, flaked purplish-crimson.
11. J. Roberts (Forbes).—Orange, suffused bronzy-crimson.
12. Luna (Forbes).—Lemon, flaked bright crimson.
13. Mark Twain (Forbes).—Mottled and flaked crimson.
14. Miss Lambert (Forbes).—Canary-yellow, and crimson.
15. Mrs. Clucas (Forbes).—Lemon, deep yellow, and flaked crimson.
16. Mrs. Heap (Forbes).—Creamy-white and orange, flaked crimson.
17. Mrs. Joe Oliver (Forbes).—White and orange, flaked crimson.
18. Mrs. Ovens (Forbes).—Lemon, flaked crimson.
19. Prosperity (Forbes).—Orange, mottled purplish-crimson.
20. R. A. Smith (Forbes).—Orange, flaked and mottled crimson.
21. S. Barker (Forbes).—Orange, flaked and finely pencilled crimson.
22. Sensation (Forbes).—White, flaked purplish-crimson.
23. Solaire (Forbes).—Yellow, suffused and mottled bronzy-crimson.
24. W. H. Young (Forbes).—Canary-yellow, pencilled purplish-crimson.
25. W. M. Moir (Forbes).—White, mottled crimson.

ANTIRRHINUMS raised from Seed.

26. Black Prince (Watkins & Simpson).—It is a dwarf variety with a sturdy bushy habit, and dark purplish-brown flowers.
27. Brilliant (Dobbie).—The spikes of this variety were 2 ft. high; it had a strong habit; was free-flowering, with large flowers of a lovely shade of bright rose-colour.
28. Cottage Maid (Dobbie).—Of a tall and slender habit; free-flowering; flowers pale pink.
29. Crimson (Dobbie).—One foot to 18 inches high; strong, sturdy habit, and very compact; free-flowering; flowers of a deep velvety purple.
30. Crimson King (Line).—Of a good upright habit, and very free-

flowering; a stiff spike of deep crimson flowers. A good late-flowering variety.

31. Golden Queen (Watkins & Simpson).—Eighteen inches high; vigorous habit, and very bushy; very free-flowering; flowers large, yellow, with lighter coloured standards. A good variety.

32. *Majus grandiflorum*, mixed (Watkins & Simpson).—Eighteen inches to 2 ft. high; diffuse habit; moderately free-flowering; flowers large, colours, various.

33. Pink Empress (Dobbie).—About 16 inches high; bushy, spreading habit; free-flowering; flowers rosy-purple.

34. Tom Thumb, mixed (Watkins & Simpson).—A very good strain of the dwarf-growing varieties with variously coloured flowers.

35. White Queen (Watkins & Simpson).—Fifteen inches high; very bushy, compact habit; very free-flowering; flower-spikes tall, stout, and laden with snow-white flowers.

36. White Queen (Dobbie).—This stock was very badly mixed.

37. Yellow Queen (Dobbie).—Sixteen inches high compact; sturdy habit; free-flowering; flowers yellow, with a golden-yellow tip.

Bedding Begonias (Tuberous).

38. Argus (Blackmore & Langdon).—Of dwarf, sturdy habit, and very free flowering; flowers borne on stiff stems, perfectly double, and rich scarlet in colour.

39. Gladiateur (Blackmore & Langdon).—Seven inches high, rather taller than Argus, and not quite so stiff in habit; flowers borne in drooping clusters with exceptional freedom; flowers small, hollyhock-shaped centre, and rich crimson colour. Very good variety.

40. Hilda (Blackmore & Langdon).—Of compact habit, and very free-flowering; flowers large and camellia-shaped, and of a warm salmon colour with a lighter centre.

41. Hollyhock (Blackmore & Langdon).—Seven inches high; sturdy habit, very free-flowering; flowers of good shape and substance; colour rose-pink, touched with a deeper shade.

42. Miss Griffith (Blackmore & Langdon).—Sturdy, compact habit; free-flowering; flowers nicely shaped, blush-white, with slightly crimped petals.

43. Bouvardia, King of Scarlets (Robson).—Of good robust habit; very free-flowering; flowers scarlet.

Border Chrysanthemums.

44. Black Prince (Dobbie).—Tall, sturdy habit; free-flowering; reflexed, of good size and of a crimson colour. Rather late variety.

45. Bronze Marie Massé (Dobbie).—Tall, sturdy habit; flowers of medium size, free-flowering and early; flowers rather small, with reflexed florets, colour orange-red shading to orange-yellow with age.

46. Bronze Martinmas (Dobbie).—This variety seems to be synonymous with the preceding variety, which it resembled in every particular.

47. Carrie (Dobbie).—Dwarf, sturdy habit; very free-flowering; flowers medium size, florets broad and reflexed, and pale yellow in colour.

48. Goacher's Crimson (Dobbie).—Medium height, bushy habit, free and early flowering; florets broad and reflexed, colour crimson with golden reverse.

49. Godfrey's Pet (Godfrey).—Dwarf, bushy habit; very free-flowering; flowers medium size, florets long and narrow and inclined to be twisted, bright yellow colour.

50. Harmony, (Godfrey).—Dwarf, bushy habit; very free-flowering, florets broad and reflexed, bright yellow.

51. Horace Martin (Dobbie).—Dwarf and sturdy in habit; free and early flowering; flowers medium size; florets broad and reflexed, pale yellow.

52. Market Pink (Godfrey).—Medium height, bushy habit, very free-flowering; flowers small; florets broad and reflexed, magenta-pink.

53. Miss Miller (Dobbie).—Medium height; bushy habit; free-flowering; flowers medium size; florets narrow and reflexed, bright yellow.

54. Mrs. Willis (Dobbie).—This variety failed to flower.

55. Murillo (Dobbie).—Tall and sturdy in habit; free-flowering; flowers medium size; florets broad and reflexed, white just faintly tinged with pink. Late variety.

56. Nellie Blake (Dobbie).—Tall and sturdy in habit; free and late flowering; flowers large; florets broad and reflexed, colour crimson.

57. Polly (Dobbie).—Medium height; bushy habit; free-flowering, flowers medium size; florets broad and erect, yellow tinged with orange-red, fading to bright yellow with age.

58. Rosie (Dobbie).—Dwarf, bushy habit; very free-flowering; flowers medium size; florets broad and reflexed, orange-red.

59. September Beauty (Godfrey).—Dwarf bushy habit; very free-flowering, flowers small; florets broad and erect, rich golden-yellow.

Various.

60. *Celosia Thompsoni magnifica* (J. Veitch). See Report, Vol. xxvii. p. 661.

61. *Coleus thyrsoideus* (J. Veitch).—A plant of erect robust habit, with velvety-green foliage, and panicle-like racemes of bright blue flowers. A very valuable winter-flowering greenhouse plant.

62. Fuchsia Heinrich Henkel (Henkel).—This seems to be a cross, having *F. corymbiflora* for one of its parents. The shape and size of the flowers resemble *F. fulgens*, but the tube is crimson, the petals larger and shaded with rose. The leaves are ovate, and deep green in colour, with a prominent red midrib and petiole.

63. German Asters.—A collection of these were received from Watkins & Simpson, and J. Veitch, which were sown and planted, but owing to the excessive moisture and the coldness of the season they were not a success.

64. Lantanas, New Dwarf Hybrids (J. Veitch).—This was a very good strain of these well-known plants.

65. Mimulas, Dobbie's Selected (Dobbie).—An ordinary strain with yellow flowers and deep crimson markings.

66. Nemesia, New Dwarf Hybrids (Watkins & Simpson).—A dwarf strain with variously-coloured flowers.

67. Petunia, The Ophir (J. Veitch).—A pretty strain with medium-sized variously-coloured fimbriated flowers.

68. *Salvia splendens*, Little Lord Fauntleroy (R. Veitch).—A very good strain of the well-known *S. splendens*.

Pentstemons.

69. A. J. Allsopp (Forbes).—Rich rose, with pure white throat.

70. André Lebon (Forbes).—Large, crimson-scarlet, pure white throat.

71. Auguste Cain (Forbes).—Very large, scarlet, with pure white throat.

72. Baden-Powell (Forbes).—Scarlet margined, crimson, large fine spike.

73. Distinction (Forbes).—Large, white, suffused rosy-scarlet, white throat.

74. Earl of Annesley (Forbes).—Crimson with chocolate blotches.

75. Frœlich (Forbes).—Very large flower and spike, purplish-crimson.

76. George Home (Forbes).—Very large flowers, bright scarlet, pure white throat.

77. General Gallieni (Forbes).—Crimson, white throat, veined purple.

78. Hamlet (Forbes).—Large open flowers, rose, white throat.

79. Hermine Wigan (Forbes).—Fine large flower, bright crimson, pure white throat.

80. Hilda (Forbes).—Fine spike, crimson, white throat, veined and edged crimson.

81. James Hamilton (Forbes).—Fine spike, rich rose, large open white throat.

82. James Ramsey (Forbes).—Scarlet, white throat, margined crimson.

83. James Robertson (Forbes).—Good spike, white, tinted rose.

84. John A. Elliot (Forbes).—Fine spike, rosy-crimson, throat veined and blotched chocolate.

85. John Forbes (Forbes).—Large circular flowers, violet-purple, white throat, blotched crimson.

86. Lady Brodie (Forbes).—Rosy-scarlet, white throat, pencilled carmine.

87. Lady-Love (Forbes).—Fine flower, white, with a slight tinge of rose.

88. Légende (Forbes).—Large flowers and good spike, white, tinged with rose.

89. Leonidas (Forbes).—Rich rose, with white throat.

90. Lewis D. Wigan (Forbes).—Rosy-scarlet, large open throat, veined and margined crimson.

91. Louis Grandeau (Forbes).—Very large flower, rose, large throat, with purple markings.

92. Mrs. Archibald Forbes (Forbes).—Rich crimson, white throat, veined chocolate.

93. Mrs. Daniels (Forbes).—Large, open flowers, purplish-rose, white throat.

94. Mrs. Forbes (Forbes).—Fine flowers, good spike, rich crimson, veined crimson.

95. Mrs. Heywood Thompson (Forbes).—Large flowers, good spike, purplish-crimson, white throat.

96. Mrs. Irvine (Forbes).—Bright rosy-pink, white throat, with purple.

97. Mrs. Norman (Forbes).—Rose-pink, large open white throat.

98. Mrs. Oliver (Forbes).—Rosy-scarlet, white throat, margined crimson.

99. Mrs. Roberts (Forbes).—Large flower, purple-crimson, throat veined crimson.

100. Mousquetaire (Forbes).—Cherry-red, white throat, blotched carmine.

101. Neil McKinnon (Forbes).—Scarlet, large open flowers, good spike.

102. N. Barnes (Forbes).—Fine flowers, good spike, dark crimson, large open white throat.

103. Ninon de Lenclos (Forbes).—Large fine flower, good spike, white.

104. Paul Cambon (Forbes).—Large flowers, violet, large white throat.

105. Paul Verlaine (Forbes).—Rose, large white throat, margined scarlet.

106. Peter Readman (Forbes).—Fine flowers, good spike, white, edged rich rosy-scarlet.

107. Phryne (Forbes).—Fine flowers, good spike, bright scarlet, white throat.

108. Port Royal (Forbes).—Rosy-violet; large white throat.

109. President Carnot (Forbes).—Fine flowers; crimson-scarlet; white throat.

110. Royal Standard (Forbes).—Rosy-scarlet; white throat, with reddish-crimson.

111. Sidi-Brahim (Forbes).—Large flowers; good spike; rosy-magenta and crimson.

112. Sir Trevor Lawrence (Forbes).—Bright rosy-crimson; large white throat.

113. Stanislas-Meunier (Forbes).—Large flower; claret-colour; crimson throat, veined white.

114. Talma (Forbes).—Large flower; good spike; light rose, edged dark rose.

115. Thomas Cook (Forbes).—Good form; crimson, veined chocolate.

116. Thomas Harvey (Forbes).—Good flower; rich rose; large open white throat.

117. Valmy (Forbes).—Dwarf and compact; rosy-crimson and dark crimson.

118. William Oliver (Forbes).—Rosy-crimson; throat circled deep crimson.

119. William Robb (Forbes).—Crimson; white throat, veined crimson.

120. William Totty (Forbes).—Good flower; crimson; large throat, veined crimson.

Ten-week Stocks (Large-flowered Dwarf).

121. Bouquet Mixed (Barr).—6 to 9 inches high; spreading habit; colours pink, rose, purple, lilac, and white.

122. Dark Violet (Barr).—1 foot to 14 inches high; sturdy habit; moderately free-flowering; flowers violet-purple, flaked and in many cases edged with white.

123. Deep Blood-Crimson (Barr).—1 foot high; rather weak habit; free-flowering; flowers large and deep crimson in colour; a large proportion of these flowers were single.

124. Delicate Lavender (Barr).—1 foot high; very free-flowering; erect habit; lavender-coloured flowers, a good number of which were single.

125. Delicate Rose (Barr).—1 foot high; sturdy branching habit, with stiff spikes of bright rose-coloured flowers passing to pink; a number of flowers were of the single kind.

126. Glowing Crimson (Barr).—1 foot high; sturdy habit; free-flowering; flowers purplish-crimson, heavily flaked with white; a few came single.

127. Pretty Soft Lilac (Barr).—10 inches high; very sturdy compact habit, free-flowering; flowers pale lilac, marked with white and borne on very stiff spikes; a few of them were single.

128. Primrose (Barr).—1 foot high; branching habit; free-flowering; flowers pale primrose colour.

129. Soft Coppery Red (Barr).—1 foot high; branching habit; free-flowering, with stout spikes of large salmon-pink flowers, edged with white.

130. White (Barr).—1 foot to 16 inches high; vigorous habit; free-flowering; flowers large and pure white, borne on very stiff spikes.

Ten-week Stocks (Perfection Giant).

131. Dark Ruby (Barr).—1 foot to 15 inches high; erect, sturdy habit; flowers deep purple, a large proportion of which were single.

132. Deep Lilac (Barr).—16 inches high; branching habit; free-flowering; flowers deep lilac, nearly all of which were single.

133. Glowing Blood-Red (Barr).—16 to 18 inches high; weak, spreading habit; free-flowering; flowers large and deep crimson in colour, nearly all single.

134. Pale Flesh-Colour (Barr).—18 inches high; free-flowering; flowers large, soft pink, passing to white.

135. Rich Purple (Barr).—1 foot to 15 inches high; vigorous habit; free-flowering; purple shaded with violet and edged with white; many single ones.

136. Rich Crimson (Barr).—14 inches high; strong habit; free-flowering; crimson, flaked white.

137. Rose (Barr).—14 inches high; erect habit; very free-flowering; flowers large, rose, marked with white.

138. Snow-White (Barr).—16 inches high; strong habit; free-flowering; flowers pure white.

139. White Branching (Barr).—1 foot high; strong and branching habit; free-flowering; strong spikes of large, pure white flowers; extra fine.

Other Stocks.

140. All the Year Round (Barr).—Dwarf, sturdy, branching habit, with deep green Wallflower-like leaves; free-flowering; flowers pure white.

141. Autumn Giant White (Barr).—Of dwarf spreading habit; free-flowering; flowers pure white, borne on stout spikes.

142. Autumn Giant Crimson (Barr).—Very bushy compact habit; moderately free-flowering; flowers rich crimson, touched with white here and there.

143. Dwarf Brompton Sunrise (Barr).—10 inches high; of rather irregular habit; free-flowering; flowers large, pale pink, borne on sturdy spikes.

144. East Lothian Crimson (Barr, Forbes).—Of rather slender habit; free-flowering; flowers crimson.

145. East Lothian Purple (Forbes).—Very sturdy and bushy habit; rich purple flowers, borne on very stout spikes.

146. East Lothian Pure White (Barr, Forbes).—Of dwarf and spreading habit; very free-flowering; flowers pure white, borne on stout spikes.

147. East Lothian Rich Blood-Crimson (Barr).—Sturdy habit; moderately free-flowering; flowers crimson, flaked with white.

148. East Lothian White (Forbes).—Of strong, vigorous habit; very free-flowering; flowers pure white.

149. East Lothian Wallflower-Leaved Red (Forbes).—Of strong branching habit; free-flowering; flowers crimson, freely marked with white.

150. East Lothian Wallflower-Leaved White (Forbes).—Of sturdy habit, and very free-flowering; leaves deep shining green; flowers large, snow-white, and borne on tall stout spikes.

151. Globe Pyramidal Choice Mixed (Barr).—Of strong, erect habit; free-flowering; colour of flowers various.

152. Giant Brompton Crimson (Barr).—8 inches to 1 foot high; sturdy habit; rather shy-flowering; flowers crimson and white.

153. Giant Brompton Pure White (Barr).—6 to 9 inches high; branching habit, with broad leaves; shy-flowering; flowers white, borne on stout spikes.

154. Sweet Pea Agnes Johnstone (Sydenham).—Pale salmon-pink flowers; standards edged with purple; wings flushed with rose.

155. Dainty (Sydenham).—Flowers white, shaded, splashed, and edged with purple; medium-sized flowers.

156. Dorothy Eckford (Sydenham).—White flowers, large and flimsy.

157. Edward VII. (Sydenham).—Flowers large; standards broad, purplish-crimson; wings deep purple.

158. Gracie Greenwood (Sydenham).—Flowers delicate pink, marked with white.

159. Mrs. Walter Wright (Sydenham).—A good variety, with shapely light purple flowers.

160. Lord Rosebery (Sydenham).—A handsome variety, with bold reddish-purple flowers.

161. Viola Maggie Mott (Burdett).—Of dwarf tufted habit; very free-flowering; medium-sized flowers of a bright lavender colour.

162. *Zea japonica rosea* (Watkins & Simpson).—Of tall vigorous habit; the strap-like leaves are from 2 feet 6 inches to 3 feet long, and 4 to 5 inches broad in the widest part; they are green, striped with bright rose, white, and creamy-white. A very effective plant for sub-tropical gardening.

REPORT ON MISCELLANEOUS VEGETABLES AT CHISWICK, 1903.

A.M. = Award of Merit.

Borecole.

1. Extra Dwarf Curled (Carter).—Plants very dwarf and sturdy; foliage of medium size, and beautifully curled.

2. Harrison's Hearting Selected (Harrison).—Plants tall, strong; foliage large, and well curled. A very productive variety.

Cabbage.

1. Early Drumhead (Carter).—Plants very dwarf; heads small, flattish round, very solid, with spreading outer foliage.

2. Early Eclipse (Harrison).—Plants very dwarf; heads medium to small, conical, solid, with a very small spread of outer leaves. A variety that very quickly becomes ready for use.

3. First and Best (Sydenham).—Plants dwarf; heads large, conical, solid, with a moderate spread of outer leaves.

4. Jubilant (Harrison).—A later form of No. 2.

5. Monster Drumhead (Carter).—Same as 'Christmas Drumhead,' which received an **A.M.** December 12, 1893. An immense flat round variety, with a large spread of outer leaves, requiring a lot of space for its development, only suitable for large places.

6. Nigger Head (Harrison).—Plants very dwarf; heads rather small, round, solid, fine dark red colour, with a moderate spread of outer foliage. A very fine pickling variety.

7. Queen of the North (Hughes).—Plant tall; heads roundish, conical, solid, with large spreading outer leaves.

8. Robert Wrench (Wrench).—See Vol. xxvii. page 657.

9. Victoria (Harrison).—Very similar to No. 7.

Brussels Sprouts.

Holborn Exhibition (Carter).—Plants tall and strong; stems covered rom base to summit with medium-sized firm sprouts; foliage large.

Cauliflower.

1. Eclipse, **A.M.** September 11, 1903 (Dammann).—Plant large, sturdy; heads large, firm, white, excellent shape; foliage large, broad, deep glaucous-green.

2. Early Emperor (Carter).—See Vol. xxvii. page 657.

3. Midsummer Day (R. Veitch).—Plants dwarf and sturdy; heads of medium size, firm, very white, good shape; foliage moderate, and deep green.

4. Primus (Dammann).—A dwarfer and darker form of No. 1.

5. Secundus (Dammann).—Very similar to 'Early London.'

Cucumber.

1. Carter's Outdoor (Carter).—The wet, cold season was much against this variety, and it was not a success.

2. Triumph (Goody).—This was stated to be a hardy variety raised from Long Ridge × a Japanese climbing variety; owing to the season, it was not a success.

Gourd.

Unnamed variety (Lodwick).—A shy-fruiting variety, with compact growth, and small green globular fruit.

Hibiscus.

Hibiscus esculentus (Bonavia).—Flowers yellow, with a purple centre, and cordate, palmately-lobed foliage; fruits or seed-pods four inches long, said to be very good when cooked.

Melon.

Hardy (Goody).—Failed to grow outside, owing to the wet and cold.

Onion.

1. Early Rose (R. Veitch).—Stock not quite fixed; bulbs flat round, skin pale red; heavy and very firm.

2. Holborn Keeping (Carter).—Bulbs long and solid, deep round; skin brown. A very handsome variety.

3. Sir John Llewelyn (Hall).—Very similar to No. 2.

4. White Globe Tripoli (Carter).—Bulbs flat round, very large, skin white, moderately solid. Fine true stock.

Radish.

1. Autumn Giant (Carter).—Not a success.

2. Extra Early Scarlet Turnip (Carter).—Roots oval, bright red, crisp, and of good flavour, and coming very quickly into use.

3, 4. Crimson Giant Forcing (Carter, Harrison).—Roots round, handsome, fine deep red colour, very crisp and tender.

5. Icicle (Harrison).—Roots long, fine shape, pure white, crisp, and good flavour.

6. Long Scarlet Forcing (Carter).—Roots very long, bright scarlet, good shape, very crisp and tender.

7. New Crimson (Harrison).—Very similar to No. 2.

Savoy Cabbage.

1. Leicester Giant (Harrison).—Heads immense, with a large spread of outer leaves, of deep green colour. A very heavy, solid variety.

2. New Natal (Harrison).—Heads large, flat, solid, pale green, with spreading foliage; plant dwarf. Very early.

3. Ormskirk (Sydenham).—Heads large, flat, firm, with moderate spread of outer leaves on rather tall plants. A very good late variety.

4. Selected Drumhead (Carter).—Heads large, and very flat; firm, with spreading foliage. Very dwarf.

REPORT ON A NEW MATERIAL FOR FRUIT-PACKING.

A SUBSTANCE greatly resembling powdered asbestos—but of which the composition was not disclosed—was exhibited at the Fruit Committee on August 18, and Mr. John Jaques, F.R.H.S., a member of the Committee, was requested to supervise an experimental package and to report. It was claimed for the substance that the softest fruit packed in it could go through the tropics without shrivelling or rotting.

Mr. Jaques attended on the day fixed, August 19, 1903, and reports of the fruit provided for packing that it "consisted of Apples, 'Ecklinville,' 'Lord Suffield,' 'Newton Wonder,' and 'Stirling Castle,' which were all quite sound, but very unripe; Grapes, two bunches each of 'Black Hamburgh' and 'Muscat of Alexandria' in medium condition; thirteen Tomatos, firm and sound and a little under-ripe; some Figs, mostly cracked and too ripe for packing. I selected six that were firm and in condition to travel an ordinary journey if packed in the usual way; a bunch of Bananas was also brought in which were in good condition, quite free from bruise or spot. It was decided to have four small boxes, 9 inches square, packed. A layer of the packing material, half an inch thick, was spread over the bottom of the box, then four Apples of 'Ecklinville' were wrapped in tissue paper and placed eye downwards in the bottom of the box, all the space around the fruits being filled up with the packing material; three Tomatos were wrapped in tissue paper and placed above the Apples, and covered with the packing material; then a bunch of black Grapes was wrapped in tissue paper and bedded in the packing material; on one side of it two Figs separately wrapped in paper, and on the other side one Banana wrapped in tissue. All interstices were filled with the packing material, and a layer over the top to fill up the box, a sheet of tissue doubled fourfold placed over the material, and the nailing on of the lid completed the box which I will call No. 1. This was sealed down by Wilkinson & Co. and consigned to J. D. Wilkinson, Bridgetown, Barbados.

"Box No. 2 contained 'Newton Wonder' Apple and 'Muscat' Grapes, in other respects same as No. 1, and was sealed by J. Herbert Scrutton, and consigned to A. Hubbard & Co., Grenada.

"Box No. 3 contained black Grapes, and 'Lord Suffield' Apple and only one Fig, was sealed by A. W. Lubbock, and consigned to H. S. Fenwick, Port of Spain, Trinidad.

"Box No. 4 contained 'Muscat' Grapes, mixed Apples, only one Fig, in other respects same as the others, was sealed by J. H. Hart, F.L.S., and consigned to The Trinidad Shipping and Trading Co."

For some reason or other the four boxes Mr. Jaques saw packed on August 19 were not sent, but box No. 3, addressed to Trinidad, was sent to the Society's office, 117 Victoria Street, with directions that it was to be opened on September 15. This was done with the following results:

Fig.—Rotten, but dried up; all the moisture appeared to have been absorbed by the packing material.

Banana had kept its shape but was quite rotten.

Grapes.—Stalks all mildewed, the berries fresh and crisp, but all flavour lost.

Tomatos.—In fair condition and of good flavour.

Apples.—Good, but flesh lost a little of its moisture and becoming flabby.

A further experimental packing took place on September 8, in the presence of the Secretary and Superintendent of the Society, who were informed that the inventor claims the following benefits for his material, viz. :—

(1) That the fruit will not decay in it for some time.
(2) That it will keep the fruit from bruising.
(3) That it will not impart any flavour to the fruit, but preserve that natural to it.

The material is remarkably light and has the appearance of white powdered clay, and costs 30*s.* a ton. Several boxes of fruit were packed with it to be sent to different places in the West Indies as tests of the material's efficacy.

Two boxes were delivered to the Society. One of these was despatched to Sir Daniel Morris, K.C.M.G., at Barbados, with the following letter :—

"Royal Horticultural Society, 117 Victoria Street, S.W.,
Sept. 8, 1903.

"Dear Sir Daniel,—An experiment is being made in packing fruit in a certain compound on the idea that in it it will keep good and fresh for long periods without (1) the loss of flavour attending freezing temperatures, and (2) without any addition of unpleasant flavour from the packing material used.

"I have addressed one such box to you, containing six Apples, six Pears, one Cucumber, one Peach, one Nectarine, eight Beans, one bulb of *Lilium candidum*. Will you or your deputy be so kind as to report to me the condition in which each of the fruits reaches you, and whether (if still eatable) they have any disagreeable flavour imparted by the packing material?

"The box leaves by the 'Statia,' which sails from Dartmouth on Saturday next the 12th, and the box is sealed with the Society's seal in four places. Kindly see and report that these are unbroken when the box reaches you.

"Of course the Peach and the Nectarine are the great test, for I do not see why the Apples and Pears, all of which are very unripe, should not keep a month or more under any conditions. Nor do I see why the bulb, the Cucumber, or the Beans should do more than wither a little but if the Peach and Nectarine—the only ripe things in the box—carry, then the material will be a great success.

"Yours sincerely,
"W. Wilks."

The other box, containing the same fruit &c. (with the exception of the Peach), was retained at the Society's office, Victoria Street, where it was opened on October 13, and the condition of the contents duly noted. After the packing the Secretary and Superintendent made the following written note :—

"We wish to put it on record :

(1) That no thoroughly ripe Peach or Nectarine could under any conditions yet known (save by refrigeration) remain in good condition for from sixteen to twenty-one days.

(2) Refrigeration of ripe fruit deprives it of a very large proportion of its flavour.

(3) That the Apples and Pears packed were so far removed from ripeness that they would under any circumstances keep good from sixteen to twenty-one days or even longer.

"Therefore, if the Peach and Nectarine sent to Barbados should be found good on arrival, they will prove that a wonderful power of preservation is to be attributed to the packing material. If they should also have preserved their flavour it will, in our opinion, demonstrate the very great value of the material.

"But if Peach and Nectarine are found rotten and the other things sound, the trial will not in our opinion have proved very much, as we believe the Apples and Pears would have kept good under any system of packing.

"We should add that each fruit was wrapped in tissue paper and firmly embedded in the packing material in an ordinary wooden box."

When the box kept at the Society's office was opened on October 13, it was found that the

Peach
Cucumber
Beans
Pear 'Clairgeau' } were absolutely rotten, whereas the

Apples
Pear 'Fondante d'Automne' } were quite sound.
Lily bulb

In the absence of Sir Daniel Morris from Barbados, Professor de Albuquerque kindly sent the following report :—

"Barbados, September 30, 1903.

"I hereby certify that I was to-day present at the opening of a small case, sealed with four (4) seals of the Royal Horticultural Society.

"The contents were arranged in two layers ; the upper layer apparently consisted of the remains of fruit &c. that were completely decayed ; they could not be identified, but, judging from the rest of the contents of the case, they corresponded with the following articles on the list :—

1 Peach
1 Nectarine
1 Cucumber
8 Runner Beans.

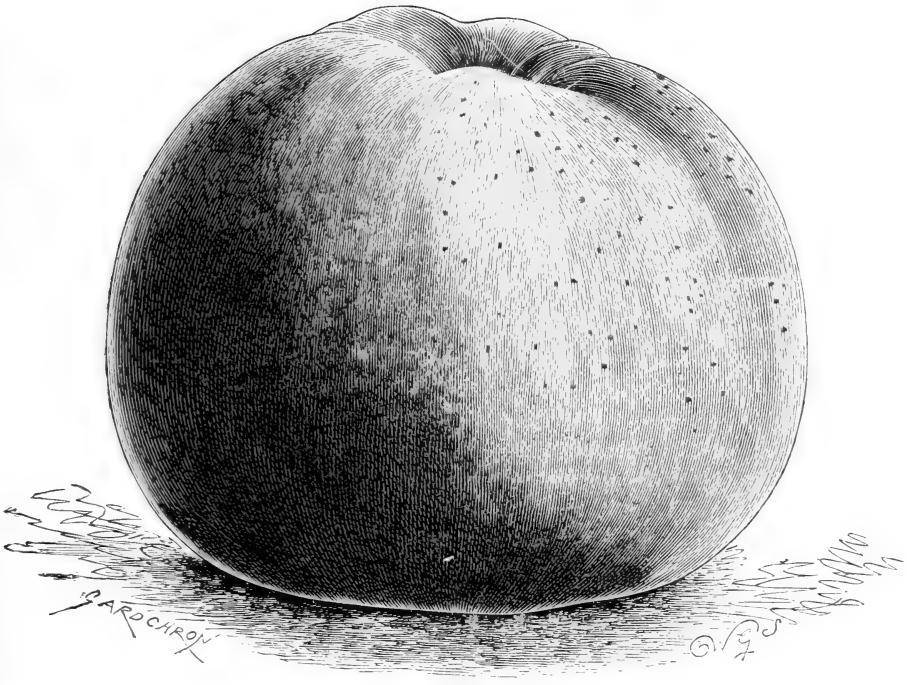
In the lower layer were:—

5 Apples in excellent condition.
1 Apple decayed.
3 Pears sound.
3 Pears, of each of which a part was decayed.
1 Bulb sound.

"The five Apples had preserved their appearance, consistency, and flavour intact. The decayed Apple had apparently rotted from the centre. The good Pears had but little flavour and were hard; apparently they had left England in this condition.

"The proximity of the decayed fruit had no apparent effect upon the adjacent sound fruit.

"J. P. DE ALBUQUERQUE,
"*For Commissioner of Agriculture for the West Indies.*"



REPORT ON APPLIANCES, MANURES, &c., AT CHISWICK, 1903.

Bulb Planters.

(1) Special Bulb Planter (Barr).—This is a most useful implement for planting bulbs in quantity. It is about 3 feet long, with strong wooden cross handles, and a stout iron tread for driving the steel-shod point into the ground. It lifts a clean circular sod of grass, which is ejected from the scoop when the next hole is made, and is ready to fill up the holes where bulbs have been put in. Naturally the work of planting is most expeditiously done when the ground is moist.

(2) American Transplanter (White).—A small tool in the shape of a bird's bill, in which a bulb can be placed and closed up again. The tool is then inserted in the soil and the handles pressed, opening the bill and releasing the bulb; or it may be used as a dibber for bulbs, but only on loose soil. It is also claimed for it that it is useful for lifting small plants and transplanting, but we have not found it so, and do not consider it of much value in this country.

Drainage Crocks.

Patent Drainage Crocks (Jones). — These are concave perforated earthenware pieces for placing at the bottom of pots for drainage, and made in different sizes. The perforations are large enough to permit worms to enter the pots, and, except for saving time in crocking pots for drainage, they did not prove better than the old-fashioned system.

Insecticides and Sprayer.

(1) Bitter Oil Insecticide (Hull Chemical Co.).—A very useful and safe insecticide for dipping plants in, or for syringing those with that are infested with thrip or aphis.

(2) Humber Brand Insecticide (Hull Chemical Co.).—Like the last, this is a very safe insecticide, effectual, and does not injure tender foliage.

(3) Tala Sprayer (Hull Chemical Co.).—This is a syringe with a reservoir attached, which is charged with the insecticide, and is ejected in the form of a very dense fine spray.

(4) Chelsea Blight Composition (J. Veitch).—A very reliable and safe wash for stove and greenhouse plants, or for destroying aphis on outdoor plants.

Labels and Holders.

(1) The Sanlac Label Holder (Climpson).—The holder is made of galvanised iron and holds the wooden or other label firmly in a horizontal position, so that the name can be easily read. The label is easily and quickly put in or removed.

(2) Patent Label (Chandler).—These are copper foil labels, made in

various forms, easily written upon or indented with a hard pencil on a pad, and, being made of the material mentioned, they are practically indestructible.

Manures.

(1) Allrich Fish Guano (Howcroft & Watkins).—This manure was tried on pot plants, both flowering and fruiting, and on Peach trees planted out, with very good results. It is a very satisfactory manure, and perfectly safe to use.

(2) Chelsea Horticultural Manure (J. Veitch).—See Vol. xxvii. p. 659.

(3) Muriate of Potash (Hadley).—On light soil the value of this manure is well known, and it is excellent for nearly all crops. For fruit and vegetables it proved very good, inducing short-jointed wood, thick leathery foliage, improved quality to the fruits, and early maturity.

(4) Sulphate of Potash (Hadley).—The effect was the same as with No. 3, except that the effect was noticed a little earlier in the growth, and the maturity of the fruit was a week later. In each case 1 ounce to the square yard—superficial—was given at about a month's interval, while active growth was being made.

(5) Kainit (Hadley).—This was applied at the rate of 2 ounces to the square yard, and as frequently as Nos. 3 and 4, with very similar results to that of No. 4. In a drier season the effect outside would probably be more striking, the year 1903 being so wet that in the trials of soluble manures they could not do themselves full justice.

(6) Stimulatus (Fox).—In appearance and action this was very similar to that of nitrate of soda or sulphate of ammonia.

Ornamental Oak Tubs.

(Champion).—These are handsome tubs, made of well-seasoned oak, strongly made, and fitted with brass handles. For large plants, especially those that have to be in prominent positions, or that have to be frequently moved, they are a great acquisition.

Patent Heating Apparatus.

Tray Economiser (Cotton).—This is a large flat apparatus which is really another boiler that can be fitted to almost any form of boiler, and take the place of the usual brick arch over the boiler, thus exposing a great heating surface to the fire. One of the "Tray Economisers" was fitted over a saddle boiler in the Society's Gardens at Chiswick, and after working several months up to December 1903 we found the consumption of fuel is one-third less, and a temperature of 10° to 15° higher is obtained, than before the "Tray Economiser" was fitted to the boiler.

Patent Sprinkler.

Improved Combination Sprinkler (Andrews).—This is an ingenious invention for sprinkling lawns, beds, or borders, and can be made to water half a circle, or a full circle, by simply turning a tap, the width of the circle being regulated by the water pressure. It is very portable, being easily

moved, as it is mounted on a small iron trolly, which can be moved while spraying, by pulling the hose-pipe.

Patent Sulphur Vaporiser.

(Campbell).—An apparatus for vaporising sulphur for the destruction of mildew, or other fungoid pests. It is an excellent invention, but must be used with great care, otherwise the damage done to the foliage would be serious. The instructions supplied with each apparatus should be followed to the letter.

Beckett's Patent Tree-ties.

(Lawson).—This is made of strong, stout ribbing, with buckle and loop attached. The great advantage of this tie is that no "rubbing" can take place, as one circle of the webbing is made round the tree or stake, and the tie is then tightly buckled, so that no movement can take place.

BOOKS RECEIVED.

"Chemistry of Plant and Animal Life." By H. Snyder. (The Macmillan Co.) 8vo. 406 pages. 6*s*. net.

This book is of American origin. The Macmillan Co. are publishing many handbooks written by the leading authorities in rural science, and almost all these books are of the highest value to persons interested in the subjects with which they deal. With very few exceptions these works are not appreciated to anything like the extent they should be, and as they certainly will be when rural science is dealt with as thoroughly and practically as it is in America. The book is on the whole a good one, the statements are clear, and it is well arranged. The instructions and cautions on manipulations are excellent—in this respect greatly in advance of most of the ordinary text-books. The methods of teaching by experiment, observation, and deductions, only the earnest practical teacher and student will sufficiently appreciate. We disagree with the author about such a statement as is made on page 168, that as soils contain traces of soluble silicates of aluminum, plants cannot well be free from aluminum. These substances, being mostly colloidal and therefore non-diffusible, although soluble, cannot under ordinary conditions enter the plant.

Probably the book will not impress the casual reader as being of such merit as it really is. It is not so good as some above referred to in this review, but the more the critic reads it the more he will like it. Probably it will not be extensively read in England—the published price is too high for our home students. Fortunate the student who either has the wisdom or the advice to select this book and masters it.

"Plant Geography, upon a Physiological Basis." By Dr. A. F. W. Schimper. Translated by W. R. Fisher; edited by P. Groom and Dr. I. B. Balfour. (H. Frowde, Amen Corner, E.C.) Large 8vo. 839 pages. Issued in 4 parts, 9*s*. each part.

This large and important work is the latest exposition of Ecology. The subject matter is divided into three Sections: I. The Factors, II. Formations and Guilds, III. Zones and Regions.

The first part deals with the influences of water, heat, light, air, soil, and animals, these supplying the external forces of the environment, in response to which plants vary in adaptation. The chapters are very brief; but a long bibliography is given—principally German—dealing with each subject at the end of each chapter.

In Part II. the climatic and edaphic factors are described, the latter being the influences of soils. These give rise to "formations" of plants, the term signifying the general type and facies of a flora characteristic of special districts, grouped as *woodland*, *grassland*, and *desert*.

The author then discusses what he calls "Guilds." These are smaller and very specialised groups, such as lianes, epiphytes, parasites, saprophytes, and insectivorous plants.

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Part III. deals with zones and districts, and is divided into five sections—tropical, temperate, arctic, mountain, and aquatic. Each of them is dealt with in detail, occupying from two to ten chapters each.

The object is not merely an enumeration of the plants occurring in these localities, but to show how the external factors are the causes of the forms of plants giving rise to the structures most suitable under the circumstances of life.

Numerous physiological phenomena are discussed, such as the importance of the optima in temperatures, not merely for the entire plant, but for each function. Periodic phenomena also show no absolute rest, but independent cessations for the different functions. The book contains five collotypes, four maps, and 497 other illustrations.

"South African Flowering Plants." For the use of beginners, students, and teachers. By Rev. Prof. G. Henslow, M.A., V.M.H. (Cr. 8vo. pp. 237, index; Longmans & Co.) 5*s*.

The purpose of this book is that anyone who wishes to acquire some knowledge of South African plants may be able to lay a foundation for further study, and also to assist teachers to bring before their pupils the physiological aspect of botany in conjunction with morphology and classification.

This is the latest phase of educational botany. Formerly it was customary to keep these departments rigidly apart; so that it was not until the structure and classification were well understood that the uses of plant-organs were taught. Now, as soon as a structure, say of the stamen and pistil, is known, the process and use of pollination are explained. It is found by experience that this greatly enhances the interest of the pupils.

A contributor to the Report of the Committee of the British Association 1903, on "The Teaching of Botany in Schools," observes: "Function in connection with structure should, we think, be prominent in every part of the school course."

The present author has pursued this course throughout; as he did with "How to Study Wild Flowers," which we remember met with unqualified approval.

Following this plan the author first gives a description of the common *Oxalis cernua* as a type to illustrate a plant's organs and their uses. As the structure of flowers leads to classification the various methods of pollination are described.

Next come the characteristic features of dry regions, as drought is the chief feature of South African climate, with an account of the various adaptations of plants. This gives rise to the Veld and Karroo plants, which abound in tubers and bulbs.

After a section on classification, the greater part of the book contains descriptions of selected typical genera of typical orders, illustrated by some 112 figures.

"Monograph of the Coccidæ of the British Isles." By R. Newstead, A.L.S., F.E.S., F.R.H.S. (Ray Society, London.)

The second volume (which completes this most valuable work) has just been published by the Ray Society, and that Society and the author are

both to be congratulated on its issue. Until comparatively recently very little attention had been paid to this family, most interesting both from an economic point of view and also from the strange forms and the curious life-history of the insects themselves. The literature of the subject is considerable, but it is chiefly in the form of papers published in our entomological periodicals, and in those of our colonies and other countries. Up to the publication of the work now under review the only one in which these insects in general were treated was one by the well-known French entomologist, V. Signoret. This, however, was first published in a French scientific publication ("Ann. de la Soc. Ent. de France") nearly twenty years ago. A few copies only were printed separately, and it is a difficult book to obtain; consequently it was very difficult to obtain any information about these pests. Now, by the aid of Mr. Newstead's two handsome volumes everyone has the means of naming any scale insects that they are likely to meet with in this country, either in their greenhouses or out of doors. Most, if not all, of the species found under glass have no doubt been introduced from abroad. On this subject the author says in his preface: "As my investigations have extended over a period of nearly fourteen years, it may reasonably be assumed that the work is thoroughly representative of the Coccid fauna of this country; but owing to the means of rapid transit it is highly probable that aliens may from time to time arrive here on freshly imported plants." The number of species dealt with in these volumes is 88; of these 37 are indigenous to the British Isles, the remainder have been introduced from abroad. The scale insects may be roughly divided into three groups. The first is that in which the insect when in its adult condition is covered with a scale formed of the skins which it has previously cast off and a secretion from its body, the insect living beneath this shelter. The first volume is devoted to this group. The second includes those insects in which the skin of the adult hardens, becomes globose, and the insect assumes more or less the appearance of a miniature tortoise, and is commonly known as "tortoise scales"; and the third group contains those which have no scale-like covering, such as the mealy bugs. The last two groups are described in the second volume. This work is illustrated by a series of very charming coloured plates, one being devoted to each species, and some in outline of anatomical details; the descriptions and life-histories of the insects are also admirably given. In the first volume there is a very interesting chapter on "Methods of prevention and remedies," which will appeal forcibly to the horticulturist. At the end of the second volume there is a very useful glossary, which in a work of this description is very necessary, as it is sometimes impossible to avoid using technical terms. Everyone interested in these insects or in the plants which they attack should, if possible, obtain a copy of this work, which will be found invaluable.

"A Naturalist in the Guianas." By Eugène André. (8vo. Smith, Elder & Co., 1904. 14*s.* net. xiv + 310 pages. With a preface by Dr. J. Scott Keltie, thirty-four illustrations and maps.)

A most interesting record of the wanderings of a collector and naturalist in the, as yet, little-known regions of Venezuela, the Eldorado

of former days. As Dr. Scott Keltie says in his preface to the book, "there is a fascination about the life, not only for those who can sit at home and read at their ease of travel and adventure, but for those who have had actual experience of its hardships and its charms." But the narrative brings home to us very forcibly the amount of peril and hardship which naturalists and Orchid-collectors have to undergo.

The comparison of the happy state of the party whilst going up the stream, with their destitution after shipwreck on the Arichi rapids of the Caura affluent of the Orinoco, impresses this point upon the reader's mind—and it is still further emphasised by the fact that all the collections and all the work of months, as well as all the necessary supplies, were lost.

Mr. André's narrative records the results of a piece of work really interesting and fruitful of scientific results. In addition to its horticultural side the book abounds with interesting information of a more general character. He describes fruits and other vegetation, the rubber and Tonquin Bean industries, as well as the Orchids and other plants which were the special object of his journey.

The book is well printed and fully illustrated, and we heartily wish the intrepid author every success in his intention of revisiting Améha and of reaching, if possible, the distant villages of the Parime Mountains, thus satisfying "the keenest desire of his life."

"The Fruit Garden." By George Bunyard, V.M.H., and Owen Thomas, V.M.H. (Royal 8vo. Country Life Office, 1904. 21*s.* net, 500 pages.)

Without any doubt the best book of the sort yet published. There is a separate chapter for every kind of fruit, and each chapter is a book in itself, for in it are the amplest details as to planting, pruning, manuring; varieties of stock for grafting and their several advantages; varieties best worth cultivation; best form of tree for various purposes, &c. &c., in fact everything that anyone possessed of the usual modicum of common-sense can need or wish for in order to succeed in fruit growing in his own garden. The book simply teems with illustrations, diagrams, and outlines. The diagrams on pruning are particularly admirable; we cannot speak too highly of them, and from them anyone should be able to teach himself to be an expert pruner as far as young trees and bushes are concerned. There are also chapters on tropical fruits and how to grow them, planting, fruit stores, propagation, insects and diseases; methods pursued in America, France, and the Channel Islands; and the book winds up with 100 pages of outline drawings of the shape of different varieties of fruits, which should be a wonderful aid to identification. Of course, in so long a work a critic could pick holes here and there—for example, that excellent Pear 'Beurré Dumont' is omitted, while 'Pitmaston Duchess,' which is only fit for bottling (when, by the way, it becomes excellent), is included in the list of dessert varieties; the Pear-leaf slug we do not notice amongst insects; and the Alpine Strawberry, as generally grown, is a long and pointed fruit, not globular as represented. But when the book is so excellent and so intrinsically valuable and useful, it would be carping to lay stress on these and a few similar little slips.

"The Fertilisation of Orchids." By Charles Darwin, LL.D., F.R.S. (8vo. John Murray, 2*s.* 6*d.* net. 300 pages.)

A fascinatingly interesting book to the student of Nature, pointing out as it does the endless diversities of structure—Nature's prodigality of resource—for gaining one and the same end. Trifling details of structure are noticed, and their causes and utility investigated, Mr. Darwin's theory being that no diversity from type ever occurs without some direct cause generally related to the benefit of the individual plant as well as to the perpetuation of the species, and from this point of view each trifling detail of structure repays investigation and research. No one who had not studied the matter would for a moment have suspected that such trifling details of structure as Mr. Darwin notices could have been of such intense importance to the life history of the species as he suggests.

"Vegetable Mould and Earth Worms." By Charles Darwin, LL.D., F.R.S. (8vo. John Murray, 2*s.* 6*d.* net, 300 pages.)

Everybody will welcome a reprint in so cheap a form of Mr. Darwin's most interesting book. He shows us in it that worms have played a by no means insignificant part in the history and formation of the earth's surface, for they bring up to the surface no less an amount of earth (weighed when dry) than ten tons an acre annually, and of this some is washed down by rain into the valleys and some is blown by the wind towards the opposite quarter to that of the prevailing wind, thus gradually but very really altering the general contour of the earth's surface. They are also of the greatest assistance to plant life by periodically turning over the mould, bringing the lower layers to the top, and exposing them to the air, and also by mixing them intimately together as a gardener mixes compost for his plants. By dragging leaves down into their burrows, tearing them in pieces, and partially digesting them, they help to form that dark rich humus which is so valuable for plant growth; their burrows, sometimes reaching down as much as five feet into the earth, aërate it and assist the passage of young root-growth.

It is very interesting to find that the subject was first suggested to Mr. Darwin by Mr. Wedgwood, the founder of our Royal Horticultural Society.

"Plant Disease and its Relation to Animal Life.' By E. F. Wright. (Sm. 8vo. Swan Sonnenschein, 160 pages, 1903.)

In many ways interesting to a scientific-minded gardener and in all ways to a student of nature. The chief argument pursued by the author runs on these lines:—Iron in the soil is absolutely necessary to the formation of chlorophyll in plants. Many soils are notoriously deficient in iron. Only those plant cells which contain chlorophyll are capable of absorbing carbon dioxide, and unless this is absorbed the necessary proteids are not formed. It follows, therefore, that animals feeding on plants deficient in chlorophyll cannot obtain or absorb the chemical constituents necessary for health. And the moral, as far as we gardeners are concerned, is: If your soil is in any degree deficient in iron use basic slag or some other iron-containing manures, chlorosis in plants

being precisely correspondent (as well as contributory) to anæmia in animals. In other respects also the author shows that variations in the vegetable world must produce variations in the animal world for which it provides food, and that these variations or deficiencies are in the main the predisposing cause in many diseases. "The quality of the food is governed by the mineral constituents present in or absent from the soil." "Variations in plant food affect the immunity or otherwise of the animal living on it, and these variations, either directly or through the animal, affect man."

"The Book of Garden Furniture." By Charles Thonger. (Sm. 8vo. John Lane, 1903. 2*s*. 6*d*. net, 100 pages.)

Under the convenient term "Furniture" are included Seats, Summer-houses, Arches, Trellises, Pergolas, Gates, Fences, Edgings, Sun-dials, Statues, Bridges, Fountains, Vases, Tubs—a goodly category. There are some capital designs for simple but solid garden seats. In the formal or Italian garden they could not be better than painted white, but in the English garden (by which we mean a combination of spreading lawn and sweeping trees and hardy flowers and shrubs) we should prefer them in oak, or, if they *must* be painted, then in a pale glaucous olive-green. On summer-houses the author is equally happy in his remarks and gives us a picture both of the outside and of the inside of one such delightsome building, which he calls "An open-air breakfast house," which makes one long for a garden large enough and a purse long enough for the erection of an exact replica of it. At page 34 again there is a charming choice of trellis-work which would look perfectly enchanting when scantily draped with Vines, Roses, Clematis, and other such like climbing plants—but again, oh, for the sufficient purse! We have not caught the latest craze of 'Pergola-fever,' as in nine-tenths of England in nine out of ten years it is hardly ever warm enough to make pergolas enjoyable; delightful in Italy and Spain and the southern parts of France, but in England we prefer to form a vista with a simple series of Rose-arches at a good distance apart, so as to let what sun we have come in—something after the style of the picture on page 50, which is itself dignified somewhat undeservedly with the name of Pergola. On page 94 there is an exceedingly pretty picture of a "Two-handled Vase," which would probably be far less expensive than most of the pretentious things we ordinarily see. The book is well worth its modest price.

COMMONPLACE NOTES.

By the Secretary and Superintendent.

Notices to Fellows.

Letters and inquiries addressed to the Secretary's Office contain abundance of proof positive that a very large proportion of the Fellows never even glance at the "Notices to Fellows" always inserted at the end of every issue of the Journal and at the beginning of the "Arrangements" for the current year, and also of the "Report of the Council." For example, the last issue of the Journal contained amongst "Notices to Fellows" an offer of Shirley Poppy seed, made by the Secretary in his private capacity as Vicar of Shirley, and gave directions how to apply for it. Over two thousand packets of seed have been given away, but fully five hundred Fellows wrote asking whether there was any seed to be given away this year; three hundred wrote to the Society's Office instead of to Shirley; and more than two hundred and fifty sent no stamped and directed envelope for return. Fellows may think it a very small thing to give a penny stamp and an envelope, and the time to direct it, in addition to the seed itself, but when all these things are multiplied by two hundred and fifty or more it is not exactly an encouragement to anyone to offer to give anything away.

Plants.

A matter very near akin to the last note is that Fellows will not read the "Conditions" printed on the "Form of Application" at the annual Distribution of Surplus Plants, and then complain about matters which the Conditions fully explain.

One Fellow who had not received the particular plants he wanted roundly asserts that it is because other Fellows are more favoured, either because they are personal friends of the officials or have some control of the gardeners. If he had only looked at the first, third, and fourth Conditions, he would have perceived the reason and been spared the no doubt painful necessity of slandering the officials and the gardeners. "Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available; and there are over seven thousand Fellows entitled to choose from the list. It is therefore obvious that if any large proportion of Fellows happen to choose a plant of which the stock is small the majority of them must be disappointed as regards that particular plant." "To avoid all possibility of favour, all application lists are kept until February 15, 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 February 15, but from the number of applications it may take a month or more before all are complied with." 'It is obvious that when

the ballot is kind to any Fellow, he will receive all the plants exactly as he has chosen, but when the ballot has given him an unfavourable place he may find the stock of the majority of plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the ballot."

Another grumbles because some other plant or plants have been substituted, and he does not chance to want what has been sent. Condition 2 explains: "When the stock of a plant chosen by any Fellow has become exhausted the Superintendent substitutes if possible some other plant which has been numbered in the Postscript in its place, but if this be impossible he uses his own judgment. It is impossible to refer again to the individual Fellow, sending him a list of plants still left in stock and asking him to choose another instead, because the fresh plant he would choose may very possibly have fallen out of stock during the interval necessitated by the correspondence, and the distribution to seven thousand Fellows cannot be stopped whilst corresponding with each."

Another complains that the plants are small. If he had read the "Conditions" he would have known beforehand that: "Only Surplus Plants raised from seeds or cuttings are available for distribution. The great majority of the plants offered are therefore of necessity *very small* and may require careful treatment for a time."

Yet another common grievance is having to pay the carriage, and to this is often added that they are not sent by the cheapest route. The "Conditions" run: "The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given in the Form overleaf."

So that everyone asking for a share of the distribution knows (or ought to know)

(1) That very likely he may not get just the plants he asks for unless he is particularly fortunate in the ballot.
(2) That he will receive absolutely just and fair treatment so far as a ballot can make it so.
(3) That if the stock of the particular thing he wanted is exhausted some other plant will be substituted according to the judgment of the Superintendent.
(4) That all the plants are small, more or less yearlings in fact, but youth with plants as with men is a fault soon overcome, and personally we always find small plants succeed eventually far better than bigger and older ones.
(5) That he will have to pay the carriage.
(6) That they will be sent by the route he himself directs.

We have written this note because the Secretary and the Superintendent feel that it is not quite fair of Fellows to write them grumbling and unpleasant letters about, and on account of, points of which they were definitely warned on the Form of Application itself.

It may be well again to say how this annual distribution of surplus plants arose. Some Fellows visiting the Gardens noticed comparatively large quantities of plants thrown upon the rubbish heap and asked if

they might have some of them, and they were told "In welcome." The knowledge of this spread till so many asked to share that it became necessary to organise the matter as it now exists. But Fellows should remember that it is only waste and surplus plants that are for disposal, and therefore, if they think them "rubbish," why apply for them? Why not leave them to those who like such kinds of rubbish? That some do value them is proved by numbers of letters, of which the following are samples: "Many, very many thanks for the lovely little plants just safely arrived"; "The plants are a great joy to me, I shall watch them grow with greatest interest"; and one gentleman, in enumerating what he considers the benefits of the Society, says: "The plants are at least worth half the subscription." These may be somewhat exaggerated benedictions, but they are not one whit more exaggerated than the opposing maledictions. After all, the Society offers abundant privileges to its Fellows without the share in the distribution of surplus and waste plants, so that those who do not appreciate this one in particular can surely pass it by with the scorn they think it merits.

International Horticultural Exhibition at Turin.

An important exhibition of flowers, fruits, &c. will be opened in May next at Turin, and will be the first of the kind ever held in Italy. It has already been taken up enthusiastically in Italy, especially at Turin, where various other industrial and art exhibitions have already been successfully held of late years. The Municipality have encouraged the project by placing at the disposal of the promoters as a site for the exhibition the Valentin Park, where previous exhibitions have proved so successful. There will be 289 competitive classes for plants, flowers, fruits, garden sundries, &c.

The importance of the exhibition has been at once recognised abroad, and very flattering promises of co-operation have already been received from France, Holland, Belgium, and Germany.

His Majesty the King of Italy has promised a most important contribution to the exhibition by directing that the Royal Gardens of Piedmont shall all be collectively represented in the form of a grand garden in the Italian style.

The exhibition will open on May 10 and continue until the 25th of the same month. From the 25th to the 31st a fair will be held for the sale of such plants and other horticultural objects as the exhibitors wish to dispose of.

Edinburgh International Exhibition, 1905.

The Royal Caledonian Horticultural Society has decided to hold an international horticultural exhibition at Edinburgh in September, 1905, and have wisely announced it in good time, that growers may have ample time and opportunity to prepare for it beforehand. His Majesty the King is offering a handsome silver cup, and the full list of prizes will probably soon be forthcoming. Mr. P. Murray Thomson, 5, York Place, Edinburgh, is the secretary of the show. We are confident that all Fellows of the Royal Horticultural Society will wish an ample measure of success to this effort of the great Scottish society, and many of them will, we hope, send a subscription to the prize fund.

Non-Transferable Tickets or Fellows' Passes.

Here is a very common complaint. "Is the rule as to the non-transferable pass of Fellows intended to be strictly carried out? It seems hard that a Fellow unable to attend a show personally should not be able to send someone else to represent him; it could be no possible loss to the Society." We venture to think there is nothing at all hard in the rule The financial part of the Society is based on the very reasonable rule of "one free transferable ticket for each £1. 1*s*." That being the case, a Fellow who subscribes £2. 2*s*. should only have two such transferable tickets. But the Society is so liberal that it says, "No, we will give you yourself for *your own private use* an extra ticket, but you must promise to only use it yourself, and not lend it to anyone under any circumstances." Is it a hardship to receive this extra personal pass? Surely not. The hardship rather comes in when a Fellow, having accepted this extra bonus of a personal pass, makes a claim to, or even *asks* to be allowed to, use it as if it were transferable. To use it as transferable is very nearly akin to defrauding, and to ask to be allowed so to use it is to put an unfair strain on the Secretary's stock of politeness. We have heard of people using other people's personal season railway tickets, but such people are perfectly conscious they are defrauding the company, and yet the train would run all the same and the seat to which AB is entitled would be empty if CD did not use it instead; yet everyone recognises that CD is cheating the company, and has no measure of pity if he be caught and imprisoned. We really fail to see the difference in the case of the Society's Fellow's personal pass.

Daffodil Yellow-Stripe Disease.

As it is now the season of Daffodil growth, it would be well if every grower would endeavour to decide what is the cause of the disease manifested by yellow stripes in the foliage, and sometimes yellow stripes on the flower-stalk, running on into white stripes in the yellow perianth. A vast number of causes have been suggested, so many and various that it is difficult to thrash anything probable out of the multitude of divergent opinions. It comes so mysteriously too. One year your stock of Daffodils may show broad deep-green foliage standing up erect and strong. Next year one or two varieties will have their foliage striped with yellow and the flower-stalks be bent and feeble, some possibly lying prone on the ground. No fungus disease can be found; it seems to be some essential debility affecting the constitution of the whole plant. At one time we had almost decided that it probably arose from poverty of soil, and then the next year a whole bed of 'Princeps' appears with "yellow-stripe," except that an average of every tenth bulb is quite healthy and strong, and as dark green, glaucous, and crisp as you could wish, and these scattered fairly regularly all over the bed, seemingly proving that it is not the soil. Here is another example: "I had last year one crown of 'King Alfred.' I divided it, planting three offsets in a row, and they are all perfectly sound. But in the same row I planted some more from an

outside source, and they are attacked. They came from a friend's garden, where last year they were in excellent health, but where this year they are attacked. It seems as if the bulbs must have caught the complaint between dying down and being replanted, and not (as my own three bulbs seem to prove) after being planted." It is a most vexatious disease, because one can never be sure that one is not introducing it to a friend's garden even when giving him an apparently quite healthy bulb, which the previous season showed no trace of disease. However, we do not yet know whether it is infectious or not. Certain varieties, *e.g.* 'Princeps,' 'C. J. Backhouse,' and 'Sir Watkin,' are very liable to it, and 'Horsfieldi' slightly so. If all growers who are troubled with it this season would send us their experiences, coupled with exact conditions of planting, manuring, and nature of soil, we might be able to collate the evidence and make some deduction.

Late Peaches.

A "Fellow" recently inquired how it was that he could purchase fine fruits of Peaches at the end of September, yet could never get any from his own garden in that month at all, although he had several Peach-houses, and excellent Peach-walls, on which the trees grew well and produced good crops of fruit. As late Peaches are always much appreciated in September and early October, if of rich flavour, the answer may be of interest to others. In the first place, one would not advise planting any of the yellow-fleshed varieties of Peaches, for though they are large, handsome, and some of them very late, the quality is usually so poor as to be little better than a Turnip. Among the best late varieties that are hardy, vigorous, large, handsome, of excellent quality, and set their fruit well, the following can be recommended, viz.:—'Bellegarde,' a fine reddish-purple coloured fruit of first-class flavour; 'Barrington,' another highly-coloured variety of good quality, which, like the last named, ripens on an outside wall about the middle of September; 'Princess of Wales' and 'Gladstone,' two large pale-coloured varieties, coming into use about the end of September, 'Princess of Wales' being a few days the earlier, and the better flavoured of the two. On heavy soils 'Raymaekers' is a grand late Peach, while on others it is poor. At Lord Llangattock's, The Hendre, it is very fine, and is highly esteemed. 'Marquis of Downshire' is a beautiful pale red Peach of fine quality, and a very valuable late variety, coming into use at the end of September. 'Walberton Admirable' is an excellent flavoured variety, usually coming into use early in October. Several others might be named, but quite sufficient have been given to ensure a good supply of late Peaches, if planted where Peaches will succeed, and the requisite cultural attention given.

The Beech-tree Pest.

The terrible *Cryptococcus fagi* continues to spread, as almost weekly consignments of it sent to us for identification prove—or possibly it is partly that people are beginning to take more notice of such things, as their minds become more educated to perceive the inherent beauty of our

English woods and country-side. A Fellow, who loves our country life and has on his own estate suffered severely from the pest, makes a new suggestion. Every one by this time surely knows that the *Cryptococcus fagi* is an insect which lives in dense communities on the outside of the bark of Beech trees. (We have never seen it on the foliage.) Its first appearance is scarcely noticeable, there being only a few minute white spots on the trunk, something like small specimens of mealy bug, but later on it increases with astonishing rapidity. Individually the insect is very small and of a dirty dingy colour, requiring a magnifying glass to detect; but the communities are only too apparent, as the insects throw out from their bodies a mass of white waxy filaments somewhat like cotton wool, which entirely covers them all over, very much as what is called 'American blight' does on Apple trees, except that, whereas the one occurs only in small patches of square inches at the most, the *Cryptococcus* may be found continually in communities of square feet, often in square yards, and not infrequently covering the whole tree from top to bottom, giving it the appearance of having been recently whitewashed. After a year or two the bark of the tree dries up and splits and flakes off in sheets, and then of course death soon ensues. On account of the thick covering of waxy substance under which they shield themselves, the insects are very difficult indeed—nay almost impossible—to reach by spraying, unless the sprayer is phenomenally powerful and intrusive. Any wash applied with an ordinary sprayer is simply thrown back by the waxy covering and rolls off like water from a duck's back. Hitherto all we have been able to advise is to cut down and burn the bark of all hopelessly doomed trees, and to scrub others with a hard and penetrating brush by hand with kerosene emulsion, which will kill all the insects it comes in contact with. Another mixture is 1 lb. soft soap, ½ pint paraffin to 1 gallon of hot water, mixing all well together, and apply with a stout penetrating brush, taking care to keep the wash well mixed while using. Another wash which we feel sure would be more valuable than either, if the sprayer is sufficiently powerful, is 1 lb. caustic soda and 1 lb. crude potash, dissolved in 10 gallons of water, and applied to the trees in the form of a spray. This should be done in winter, while the trees are dormant, and the user ought to wear strong leather gloves while doing it, and take care the wind does not blow the spray back into his face. We doubt whether there is a sprayer of sufficiently penetrating power, and the scrubbing is, of course, a very slow and tedious process, and can only be applied in the case of a favourite tree here and there, young trees, or trees only just beginning to be attacked. Happy the tree-owner who has an eye to detect the commencement of such attacks as these! Our correspondent's new suggestion is to pass a painter's blow-lamp rapidly over the surface of the affected trees. We should think it would certainly destroy the *Cryptococcus*, and if done rapidly enough would possibly not hurt the bark. At all events it is a novel plan, and one worth trying as a first experiment on some tree affected, which the owner would not much miss even if the cure proved fatal; or it might be tried on some tree hopelessly attacked, in which case it could only hasten the inevitable end by twelve months or so. All we urge is, let it be done carefully and rapidly, so that a reliable trial may be made.

Watercress.

Attention has recently been called to the risk of eating Watercress unless direct knowledge is obtainable as to the way in which it has been grown, as much of it is said to be cultivated in beds to which sewage from various sources finds its way. A Fellow points out how easily it can be grown in almost any vegetable garden. Choose for convenience a spot near a garden tap; take off 4 inches or so of the surface soil from a plot, say 3 ft. by 2 ft., and slightly puddle the sides and bottom with clay, but not ramming it so firmly as to prevent the water percolating sufficiently to avoid stagnation. Nearly fill this artificial basin with good soil, and in early spring plant it with cuttings of fresh clean Watercress obtained from a wholesome source. Keep the soil moist, and the cuttings will soon spread and cover the bed, and if small clean pebbles can be strewn over the surface they will keep the roots moist and the leaves clean when the heavy rain would otherwise spatter them with mud. Seed can be used if good clean cuttings are not obtainable, but several weeks' growth is gained by planting cuttings.

Camellias in the Open Air.

It is somewhat astonishing how comparatively few people who possess gardens are aware how hardy the Camellia is in the open air. That it is hardier than the Common Laurel was proved during the very severe frosts that we had ten years ago, when the Laurels were cut down to the ground but the Camellias were uninjured. There were for many years fine plants 10 to 12 feet high in the Society's gardens at Chiswick which scarcely had a leaf injured during that memorable frost. At Chiswick they grew behind a north wall in bush form, and every year they flowered most profusely. In several other places we have seen Camellias a great success outside, but in every instance the trees have been sheltered from the east, not that they would not stand the cold winds from that quarter, but after a very sharp frost the sun striking on the plants early seems to inflict damage on the foliage. In any other position facing to any other point of the compass they appear to be perfectly happy. One other item may be mentioned, viz. that a windy situation is not favourable at the time of flowering, as the blossoms get damaged and disfigured by knocking against each other. Provided there is a good escape for all surplus water, they do not appear at all fastidious about soil, making themselves at home almost immediately and holding their own with other shrubs which are not of more vigorous habit. The best time to plant is the middle of May, when everything is favourable for active growth both above and below the surface of the soil. Before planting, the ball of the plant ought to be thoroughly moist, and if dry weather follows a copious supply of water should be given occasionally throughout the first two summers after planting.

Imports and Exports.

The December 1903 Trade and Navigation Returns, which were issued in January last, include particulars of the imports and exports of the whole of the twelve months of 1903, and the following Tables have been

drawn up from them in order to show the quantity and value of the principal imports which are of interest to horticulturists.

TABLE I.—SHOWING THE IMPORTS OF FRUIT AND VEGETABLES DURING 1901–1903.

Description	Quantities			Values		
	Year 1901	Year 1902	Year 1903	Year 1901	Year 1902	Year 1903
FRUIT:				£	£	£
Apples, raw . . . (cwts.)	1,830,210	2,843,517	4,568,413	1,182,782	1,923,474	2,781,348
Apricots and peaches, raw „	13,463	16,112	9,578	32,350	33,391	21,584
Bananas, raw . . (bunches)	2,228,672	2,804,700	3,087,516	875,540	1,060,263	1,196,887
Cherries, raw . . . (cwts.)	212,683	166,359	110,192	213,585	216,421	167,142
Currants, raw . . . „	70,402	76,080	76,419	75,308	92,112	110,525
Gooseberries, raw . . „	21,735	27,564	34,312	11,420	16,919	28,444
Grapes, raw . . . „	679,885	632,932	687,938	694,942	676,992	717,830
Lemons . . . . „	1,071,534	1,003,298	978,318	434,514	417,152	406,728
Nuts: almonds . . . „	111,322	149,574	157,159	414,122	554,460	544,977
„ other nuts, used as fruit „	904,224	783,788	791,278	676,508	641,394	667,899
Oranges . . . . „	5,281,657	6,518,107	6,176,789	2,119,728	2,358,708	2,275,480
Pears, raw . . . . „	348,866	491,906	271,483	296,411	439,536	326,463
Plums, raw . . . . „	263,700	541,136	596,182	243,705	515,059	622,948
Strawberries, raw . . „	38,604	40,211	32,644	51,290	58,080	49,362
Unenumerated, raw . . „	535,247	500,679	688,876	302,013	308,998	449,213
VEGETABLES, RAW:						
Onions . . . . (bushels)	7,295,418	7,605,489	8,619,719	869,397	999,942	1,003,026
Potatos — From Germany . (cwts.)	1,256,517	258,692	2,228,695	237,394	44,994	422,569
Potatos — „ France . „	1,906,375	2,248,443	2,796,483	538,536	626,271	839,791
Potatos — „ Channel Islands . „	1,020,654	1,268,098	1,103,215	447,680	481,134	649,496
Potatos — „ Other countries „	2,893,180	1,923,857	3,021,809	627,977	437,033	691,048
Total	7,076,726	5,699,090	9,150,202	1,851,587	1,589,432	2,602,904
Tomatos . . . (cwts.)	793,995	783,894	1,008,435	733,471	700,126	951,499
Unenumerated . . value £	—	—	—	389,829	468,411	396,957
FLOWERS, FRESH: value £	—	—	—	224,911	267,281	248,689

Many other horticultural products have been omitted, such as bananas, chicory, coffee, tea, tobacco, and cotton, because they could not well have been produced in this country, and statistics of a more generally agricultural character have also been omitted.

The great increase in the imports of fruit and vegetables may in some measure be due to the steady improvement in the food of the lower classes, and in some degree to the bad home season of 1903. The figures given in Table I., however, afford considerable matter for reflection, when we compare them with the exports in Table II.

TABLE II.—SHOWING THE EXPORTS OF FRUIT &c., 1901–1903.

Description	Quantities			Values		
	Year 1901	Year 1902	Year 1903	Year 1901	Year 1902	Year 1903
Confectionery, jams, and preserved fruits . . . . (cwts.)	309,251	332,763	319,931	£ 749,572	£ 846,609	£ 802,879
Pickles, vinegar, sauces, and condiments . . . . value £	—	—	—	801,312	670,742	575,653
Provisions, unenumerated . .	—	—	—	1,241,207	1,389,302	1,044,006

The acreage at present under small fruits and market gardens is given in Table III., and it is evident that much more fruit and vegetables might be grown in nearly every part of the United Kingdom.

TABLE III.—ACREAGE UNDER SMALL FRUIT AND ORCHARDS AND THAT RETURNED AS WOODS AND PLANTATIONS.

Compiled from the Board of Agriculture Returns.

—	Small Fruits			Orchards		
Year	1901	1902	1903	1901	1902	1903
	acres	acres	acres	acres	acres	acres
England	67,828	68,263	68,968	228,580	230,673	233,286
Wales	1,092	1,203	1,230	3,767	3,767	3,748
Scotland	6,079	5,912	5,954	2,313	2,416	2,449
Great Britain	74,999	75,378	76,152	234,660	236,856	239,483
Isle of Man and Channel Islands	599	698	525	1,543	1,697	1,997

* The acreage under Orchards is that of arable or grass land used for fruit trees of any kind.

The timber imports and exports are given in Table IV., as forestry is so nearly allied to horticulture, and is being so greatly improved at the present time. We trust that the efforts of the Board of Agriculture, and of the various official departments, societies, and others interested, will have the effect of reducing the annual bill of over £27,000,000 for foreign-grown timber, against which we have as a set-off only some £214,000 in exports.

TABLE IV.—SHOWING THE IMPORTS AND EXPORTS OF WOOD AND TIMBER, 1901–1903.

Description	1901	1902	1903	1901	1902	1903
Imports:	Loads	Loads	Loads	£	£	£
Hewn: Fir, oak, teak, &c. (other than Pit Props or Pit Wood). From Russia	270,684	227,784	291,665	636,204	548,747	650,511
„ Sweden	28,683	30,710	35,537	49,807	51,326	63,839
„ Norway	54,770	59,632	64,591	104,810	107,481	117,586
„ Germany	227,337	189,071	185,029	656,296	528,973	548,368
„ U.S.A.	163,303	180,742	191,895	799,756	922,102	1,023,863
„ British East Indies	39,053	40,756	54,117	475,018	502,517	705,273
„ Canada	88,738	78,887	66,559	495,941	460,542	443,744
„ Other countries	20,517	24,657	26,467	179,131	218,610	291,116
Total	893,085	832,239	915,860	3,397,026	3,340,298	3,844,300
Hewn: Pit props or pit wood	1,879,810	1,978,485	2,321,655	2,053,026	2,094,906	2,534,950
Total of wood hewn	2,772,895	2,810,724	3,237,515	5,450,052	5,435,204	6,379,250
Sawn or split, planed or dressed. From Russia	1,828,237	2,049,850	1,964,297	4,424,114	5,055,215	5,071,865
„ Sweden	1,685,362	1,680,371	1,683,659	4,035,671	3,882,908	4,062,601
„ Norway	468,537	504,110	559,206	1,314,717	1,318,510	1,549,738
„ U.S.A.	617,415	593,478	700,150	1,987,143	1,899,094	2,306,175
„ Canada	1,517,234	1,639,668	1,507,530	4,029,223	4,385,261	4,267,675
„ Other countries	164,215	209,249	326,265	528,146	630,434	929,362
Total	6,281,000	6,676,726	6,741,107	16,319,014	17,171,422	18,187,416
Staves of all dimensions	140,064	119,992	129,942	730,521	668,630	570,859
Furniture woods, hardwoods, and veneers: (tons)						
Mahogany	74,180	61,896	88,938	641,301	532,438	797,100
Other sorts	241,650	227,350	175,724	1,421,557	1,379,025	1,183,499
Total of wood and timber	—	—	—	24,562,445	25,186,719	27,118,124
Exports:						
British and Irish:						
Rough, hewn, sawn, or split, and staves	2,151	3,878	7,684	16,020	25,552	51,042
Foreign and Colonial:						
Sawn or split, planed or dressed	21,467	25,660	25,237	107,594	137,015	129,937
Wood, manufactures of, furniture and cabinet ware . value £	—	—	—	—	—	33,587
Total exports	—	—	—	—	—	214,366

The acreage of woods and plantations was returned separately in 1895, and the Departmental Committee of the Board of Agriculture on Forestry recommend, in their Report dated November 29, 1902, that "the inquiry conducted in 1895 concerning the area of woodlands be repeated by the Board of Agriculture, and the details concerning the timber crop grown upon them be ascertained."

Potato Disease.

A Fellow writing from Cornwall sends us the following information. Having observed that Potatos grown on a red gravelly soil seldom if ever suffer from the disease, he accounts for it by suggesting that very few species of fungi can thrive where there is an abundance of iron oxide. He says that, apart from sulphate of copper, one of the very best antidotes for the disease is the black rust or flake from a blacksmith's shop, which should be hand-sown on the surface of the soil and will then by the natural action of the air and rain be dissolved from its chemical condition of iron protoxide into ordinary iron rust. He adds that he has himself tried the sweepings from a blacksmith's shop with the greatest success, not a single tuber being found diseased. The black flake and scale from smiths' shops are now a waste and valueless product, but our correspondent prophesies that some day their manurial value for soil dressings where cultivated vegetables are grown will be appreciated.

White Fly on Tomatos.

One of our Irish correspondents says, "I am dreadfully troubled with White Fly on indoor Tomatos; can you tell me of any simple remedy?" We think the pest can be easily eradicated in the following manner:—Mix up some flowers of sulphur with skim milk to the consistency of a thin paste and paint all the hot-water pipes in the house with it, closing the house in the evenings when the pipes are nice and warm. If this is done for about a week and the sulphur allowed to remain on the pipes, not only will all White Fly be killed, but as the young ones hatch out from the eggs laid on the plants, they also will succumb.

Fruit Trees from the Cape.

A correspondent who is greatly interested in the production of very early fruit from trees in pots asks, "How do fruit trees behave when brought over from the southern hemisphere? Steamers from the Cape now only take sixteen or seventeen days. Apropos, therefore, of the difficulty of forcing in January early pot Vines, Peaches, Nectarines, &c., suppose the trees were grown in pots at the Cape, where they would flower in September or October, and were brought over here a little before that time so as to bloom in a greenhouse here, would it not obviate the hard forcing necessary to give us ripe fruit in February and early March?"

The idea is certainly novel, but we doubt whether it is practical, as the trees would have to come through the tropics to our cold, short, dark days. This would probably give them a check. If they were kept in

pots during the voyage they must necessarily take up a great deal of room, and the watering would have to be very carefully attended to, or all the buds would be "thrown." If, on the other hand, they were stored in the hold of the ship, they would probably be very warm and would in consequence rush out into growth, which would become bleached in the darkness, and would be more than useless when brought up into the light. Notwithstanding, it would be an interesting experiment to try.

Roots and Manures.

Here are some questions we have been asked, and the answers given to the best of our ability. They may interest others besides those first concerned.

1. "Is it not the case that the fibrous roots of an Apple tree nourish the fruit, and have to do with it generally, rather than the larger roots?"

Such is generally considered to be the case, but it would be a very difficult thing to prove. In any case the object of the cultivator should be to encourage fibrous roots near the surface of the soil, where they will receive all the benefits of light and warmth and air, and promote sturdy short-jointed fruitful wood. The long, large, deep roots are usually associated with superabundant growth and long, gross, sappy shoots.

2 "Where a tree is making wood sufficiently, and therefore in no special need of nitrogenous manuring, is it a matter of any consequence to apply manure *only so far* as the root area extends and not beyond it, thereby discouraging root extension and consequently wood-growth?"

A good and generally safe rule to follow is to give no nitrogenous manure at all unless the growth of the trees is weakly, or unless they are bearing a very heavy crop of fruit. In the latter case it is better to spread the manure all over the root circle, but in the former to spread it slightly beyond it, so as to encourage the roots both to extend and also to keep near the surface.

3. "I have always understood that farmyard manure applied in winter favours wood growth in fruit trees, and therefore may cause a lessened 'setting' of the fruit, owing to the manure being over-rich in nitrogen. Is this mischievous tendency (if the suggestion be correct) properly counteracted by extra applications of phosphatic and potassic manures, artificial of course?"

No doubt it would—but wood growth may possibly be needed. As a matter of fact, all manuring should be done with the most careful judgment. If, for example, the trees are comparatively barren and are making satisfactory growth, no manure at all of any sort or at any time should be given; whereas if the trees are exactly the opposite, crowded with bloom-buds and making hardly any growth, farmyard manure in winter (*i.e.* February) might do them good. As a general rule, winter is not a good time for manuring fruit trees; for, supposing frost to come during the blooming time, little if any fruit will set, and the manure in that case will probably cause strong long-jointed wood, comparatively devoid of fruit buds for the following year, whereas if the manure be withheld until the fruit is set, a very little consideration will decide whether to give manure or not, according to the heaviness of the crop set. Moreover, at this later

period root action is active, and the trees will get the full benefit of the manure applied, whereas if it be put on in early winter many of the manurial salts will be washed away by rain and snow. We are firm believers in the combined use of phosphatic and potassic manures along with natural farmyard or stable dung.

4. "In a large area of fruit, is it not wise to apply special phosphatic and potassic manure to the soil yearly, independently of all other applications?"

If the trees are bearing good crops, by all means apply phosphatic and potassic manures in conjunction with the natural. If the crop is light, give potash and phosphates only. And if there be no crop at all give no manure at all unless the growth of the tree is weakly and you desire to stimulate wood-growth.

On Artificial Manures.

A Fellow writes: "I have been very much interested in the paper on manuring market-garden crops in the last issue of the Journal. But, while it gives exact directions as to the time for using nitrate of soda, it is not equally precise as to the time when superphosphates, kainit, basic slag, and sulphate of potash are to be applied. Supposing I wish to use dung, superphosphates, and kainit for a crop, is it best (i.) to dig in all three together in November or December, or is it better (ii.) to dig in the dung in November and the chemical manure in February or March; or (iii.) dig in the dung in November and broadcast the chemicals directly after and not dig in; and (iv.) is it better to use the chemical manures in dry or wet weather, supposing they are broadcasted?"

The first point to remember is the different nature of the manures. Basic slag is a slowly-acting material, and hence requires applying early.

Superphosphate and kainit both act more quickly, though if put in the soil they are not readily removed from it and lost like nitrate of soda. Superphosphate and kainit may be quite well used at the time of sowing, or, where dung has already been ploughed in, they may be used later and broadcasted.

Basic slag is all the better for being applied quite early, say even before the plant is sown.

With some crops, such, for instance, as Potatos, where dung is used, it is a good plan to put the dung in the furrows, and to sow superphosphate and kainit along with it, depositing these on the dung, and then closing over. The point to remember is, not to place artificial manures beyond the reach of the plant.

It is not well to sow these artificial manures in wet weather.

In the case of nitrate of soda a dry day should be chosen, but if shortly followed by rain so much the better.

Nurseryman, Amateur, Gardener, Cottager.

Not a month passes without our being requested to explain the meaning of one or other of the designations above, and it is a most difficult—almost impossible—task. The strict meaning of the terms is probably this:—

Nurseryman.—A man who makes his living chiefly by growing and selling plants and seeds.

Amateur.—A man who either (*a*) himself grows, or (*b*) employs another to grow for him, plants, fruits, and vegetables chiefly and intentionally for home use, though the surplus may possibly be sold.

Gardener.—A man who earns his living mainly, if not entirely, by growing, or helping to grow, plants, &c. for an amateur.

Cottager.—This seems impossible of accurate, or, at least, satisfactory definition. We know of nothing better than: A man whose house and garden are rated at less than £10 a year (but see below) and who employs no help beyond his own home family in the cultivation of his garden.

Market-Gardener.—The only practical difference between the definition of a nurseryman and a market-gardener is that the former sells to private customers, the latter in the open market; the former mostly in small quantities, the latter mostly in large consignments.

We know of no better definitions than the above, though admittedly they are by no means perfect, and many exceptions to them will arise. It is often contended, for instance, that an "amateur" is "a man cultivating for home consumption only, and employing no paid assistance whatsoever." But this gives rise to endless heartburnings and squabblings. Someone has got a man to wheel in some manure for him and paid him a shilling or two to do it; is he disqualified? Someone has a stableman who occasionally fills up his spare time by helping his employer in the garden; does that disqualify? Some local societies endeavour to define an "amateur" as "a man who employs no *regular* assistance in the cultivation of his garden." And then endless questions rise as to the meaning of the word "regular." Of course, if you employ a man half a day once a week, that is "regular assistance," and it amounts to twenty-six days a year. Another employs a man one day a week from April to October, and not at all in the winter months. This is "regular" if the summer only is counted, but decidedly not "regular" if the whole year is the basis of measurement, as it should be. So that this latter gentleman, although he employs a man about thirty days in the year, passes as an amateur, whilst his neighbour, whose assistant only works for him twenty-six days in the year, is refused the title. The occasional help from the stableman or knife and boot boy also creates difficulties; and numberless others, far too numerous to recount, are always being brought to our notice.

Difficult as it is, therefore, to define "amateur" and "cottager," we think the definitions we have given above create the smallest friction, and though the £10 rating for cottagers may have to be changed for some other figure in different parts of the country, the principle remains the same.

Wounds in Trees.

A Fellow writes:—"I am lopping a good many Park trees. The branches cut off are from 2 to 5 inches across. Do you advise any tar, paint, or composition to put on the stumps to prevent bleeding?" We are strongly of opinion that all tree wounds should be tarred, not to prevent bleeding, for if the trees are cut in the winter there will be no

bleeding to hurt, but (1) to prevent the entrance of the germs of Fungi, and (2) to keep the wood from rotting before the tree has had time to scab the wound over. A large wound untarred is almost certain to rot in the centre before it has had time to scab over, and when once rot sets up, healthy scabbing-over ceases and a permanent wound is established, which gradually penetrates to the trunk of the tree and brings on general decay. But the more important use of tar is to guard against the germs of Fungi obtaining an entrance. The air, as is well known, is full of such germs, and many of the Fungi are happily unable by themselves to penetrate the healthy bark of a tree, but if the tree be wounded and the wood left bare the seed germs will settle upon it and the hair-like roots and branches of the Fungus will grow down into and permeate the tissue of the wood, and spread all over the tree, and in time destroy it. The fungus germs cannot get through a coating of tar. We prefer a mixture of half Stockholm and half gas tar boiled up together and put on hot, and as soon after the wound is made as possible. We should always devote the last hour or so of the day's work to tarring the wounds made previously, so as never to leave a wound naked more than a few hours. There should, however, be no "stumps" left, as all branches should be cut off cleanly close in to the trunk.

Vegetables.

It is a difficult and rather a delicate thing to be asked, "What seeds do you advise us to use in our Kitchen Garden?" but we must not shirk a matter because it is difficult. We have therefore advised:

Beans, Dwarf.—'Ne Plus Ultra.'
„ Broad.—'Mammoth Long Pod.'
„ Runner.—'Best of All.'
Cauliflower.—'Early London' and 'Autumn Giant.'
Broccoli.—'Winter White' and 'May Queen.'
Cabbage.—'Ellam's Early' and 'Nonpareil.'
Carrot.—'Intermediate.'
Celery.—'Major Clarke.'
Brussels Sprouts.—'Sutton's Exhibition.'
Lettuce.—'Paris Market' and 'Paris Green Cos.'
Peas.—'Bountiful,' 'Ideal,' 'Duke of Albany,' 'Captain Cuttle,' and 'Autocrat.'
Potatos.—'Sir John Llewelyn,' 'Windsor Castle,' and 'Duke of York.'
Turnip.—'Early Stone,' 'Six Weeks,' and 'Orange Jelly.'
Tomato.—'Comet.'
Vegetable Marrow.—'Pen-y-byd' and 'Moore's Cream.'
Parsnip.—'Student.'
Parsley.—'Moss Curled.'
Leek.—'Musselburgh.'
Onion.—'James Keeping' and 'Ailsa Craig.'
Beet.—'Cheltenham Green Top' and 'Egyptian.'

We have purposely excluded novelties not yet sufficiently proved, and probably too expensive for a small private garden.

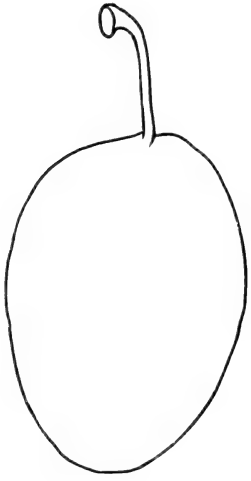
Green Tomato Pickle.

On October 13, 1903, Mr. J. Gregory, of Canterbury Road, Croydon, placed before the Fruit and Vegetable Committee a jar of Green Tomato Pickle, which the Committee considered to be the best flavoured they had ever had before them. Mr. Gregory has very kindly given us the recipe, viz.:—

"Slice 5 lbs. of green Tomatos into an earthenware jar, sprinkle salt on each layer, and let the whole stand for 12 hours. Then turn it all out into a sieve to drain, afterwards put it into a saucepan with only just sufficient vinegar to cover the Tomato, and add ½ lb. of sliced Onions, ½ lb. of brown sugar, ¼ oz. of cloves, ¼ oz. of long pepper, ¼ oz. of mustard seed, ¼ oz. of ginger, 3 cayenne pepper pods. Simmer the whole until tender. Then bottle and cork, and keep in a dry place. It is ready for use as soon as cold."

Liquidambar styraciflua.

Why this beautiful North American tree is not more frequently planted we cannot imagine, as it is hardy, not particular as to soil, and makes a beautiful object wherever it grows. Some say, "Yes, but you want a favourable season to get it well coloured." The truth of which, of course, depends on what is a favourable season for the plant. After the dull wet summers of 1902 and 1903 the foliage was quite as beautifully coloured as usual, and we have never seen a more gorgeous sight than the tree in the Society's Gardens at Wisley last autumn; it was one mass of brilliant glowing crimson. What a glorious feature they would make as street trees in country towns where the atmosphere is fairly free from pollution! Yet we have never heard of their ever having been tried in such positions, and for all we know they might succeed even in smoky towns.

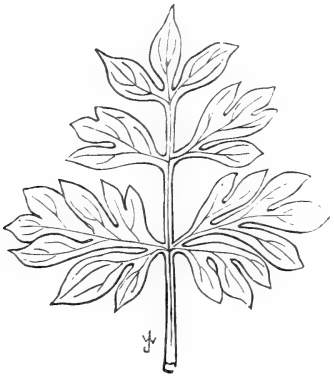


BOOKS PRESENTED, PURCHASED, OR REVIEWED DURING THE YEAR 1903, AND DEPOSITED IN THE LIBRARY.

1 = Sent for review.
2 = Purchased.
3 = Presented by the Rev. W. Wilks, M.A.
4 = „ „ Miss Willmott, V.M.H.
5 = „ „ the Director, Royal Gardens, Kew.
6 = „ „ the Rev. Prof. G. Henslow, M.A., V.M.H.
7 = „ „ the author.
8 = „ „ the Bentham Trustees.
9 = „ „ Mrs. Langridge.
10 = „ „ Sir Thomas Hanbury, K.C.V.O.
11 = „ „ the Trustees of the British Museum.

Arnott, S. (1) "The Book of Climbing Plants."
Bailey, L. H. (2) "Cyclopedia of American Horticulture," vol. 4.
Baker, R. T., and Smith, H. G. (2) "A Research on the Eucalypts, especially in regard to their Essential Oils."
Baltet, C. (2) "La Pépinière fruitière, forestière, arbustive, vigneronne et coloniale."
„ (2) "The Art of Grafting and Budding," ed. 5.
Bartrum, Rev. E. (1) "The Book of Pears and Plums."
Bateson, W. (3) "Mendel's Principles of Heredity. A Defence."
Batson, H. M. (1) "A Concise Handbook of Garden Flowers."
Beckett, E. (1) "The Book of the Strawberry."
Beissner, E., Schelle, L., and Zabel, H. (2) "Handbuch der Laubholz-Benennung."
Bonnier, G., and Sablon, L. du (2) "Cours de Botanique," fasc. 3, pt. 1.
"Botanical Magazine, General Index to the" (4)
Bourne, Rev. S. E. (1) "The Book of the Daffodil."
Castle, R. Lewis (1) "Packing and Selling Fruit and Vegetables for Cottagers and Small Holders of Land."
Collin, E. (2) "Précis de Matière Médicale."
"Coniferæ, Hand-List of" (5), ed. 2.
Cook, E. T. (1) "Sweet Violets and Pansies, and Violets from Mountain and Plain."
Cooke, Dr. M. C. (6) "Fungi: Their Nature, Influence, and Uses."
Coste, L'Abbé (2) "Flore descriptive et illustrée de la France," vol. ii., fasc. 3, 4, and 5.
"Dahlia (The) (1): Its History and Cultivation."
Dalla Torre, Dr. C. G. de, and Harms, Dr. H. (2) "Genera Siphonogamarum ad Systema Englerianum conscripta," fasc. 5.
Dean, A. (2) "Vegetable Culture."
Dehérain, P. P. (2) "Traité de Chimie Agricole," ed. 2.
Druery, C. T. (1) "The Book of British Ferns."
Dybowski, J. (2) "Traité pratique de Cultures Tropicales."
Elliot, G. F. Scott (1) "Nature Studies (Plant Life)."
Engler, A. (2) "Das Pflanzenreich," Heft 18.
Ewart, A. J. (2) "On the Physics and Physiology of Protoplasmic Streaming in Plants."
Fitzherbert, S. W. (1) "The Book of the Wild Garden."
"Flora of Tropical Africa" (5) iv., pt. 3.
"Gardening Year-Book and Garden Oracle" (1) 1903.
Griffiths, A. B. (2) "Special Manures for Garden Crops."
Gubernatis, A. de (2) "La Mythologie des Plantes, ou les Légendes du Règne végétal."
Hall, A. D. (7) "The Soil"
Held, P. (2) "Die Veredelungen von Obstbäumen und Fruchtgehölzen."
Henry, E. (2) "Atlas d'Entomologie forestière."
Hoffmann, Dr. J. (1 & 2) "Alpine Flora for Tourists and Amateur Botanists."
Hooker's (8) "Icones Plantarum," viii., pt. 3.
Hudson, W. H. (2) "Birds in London."
Hughes, E. G. (2) "The Sources of Plant Food."
"Icones Bogorienses" (2), vol. ii., fasc. 1.
Index Kewensis" (2), Suppl. i., fasc. 2.

JARVIS, M. R. (1) "The Tree Book.'
"Linnean Society, Transactions of the" (9), vols. 1–22.
MACDOUGAL, D. T. (2) "Practical Text-Book of Plant Physiology."
MASSEE, G. (2) "British Fungus-Flora," 4 vols.
MAYER, A. (2) "Resultate der Agriculturchemie."
MOUILLEFERT, P. (2) "Exploitation et Aménagement des Bois."
" (2) "Principales Essences forestières."
" (2) "Traité des Arbres et Arbrisseaux . . . cultivés en Europe et plus particulièrement en France."
MUDGE, G. P., and MASLEN, A. J. (1) "A Class-Book of Botany."
MÜLLER-THURGAU, H. (2) "Der rote Brenner des Weinstockes."
NICHOLLS, H. A. A. (2) "A Text-Book of Tropical Agriculture."
NORTHCOTE, LADY ROSALIND (1) "The Book of Herbs."
OLIVER, J. W. (2) "Elementary Botany," ed. 12.
PAUL, W. (7) "The Rose Garden," ed. 10.
"Primrose and Darwinism" (6), by a Field Naturalist.
RICHTER, K. (2) "Plantæ Europææ," ii. fasc. 3.
"Riviera Nature Notes" (2), ed. 2.
" (10), ed. 2
ROBINSON, W. (1 & 2) "Alpine Flowers for Gardens, ' ed. 3.
RODRIGUES, J. B. (2) "Sertum Palmarum Brasiliensium," 2 vols.
SARGENT, C. S. (2) "The Silva of North America," vols. 13 & 14.
" (2) "Trees and Shrubs. Illustrations of new or little-known Ligneous Plants," Parts 1–3.
SCHNEIDER, C. K. (2) "Dendrologische Winterstudien."
SCHUMANN, K. (2) "Blühende Kakteen (Iconographia Cactacearum)," Lief. 9, 10, 11, 12.
" (2) "Gesamtbeschreibung der Kakteen," Nachträge 1898 bis 1902.
SOMERVILLE, W. (2) "Farm and Garden Insects."
STRASBURGER, E. (1 & 2) "A Text-Book of Botany."
SURINGAR, W. F. R. (2) "Illustrations du genre *Melocactus*," livr. 1 & 2.
THEOBALD, F. V. (11) "First Report on Economic Zoology."
THONNER, F. (2) "Flore analytique de l'Europe."
URBAN, L. (2) "Symbolæ Antillanæ," vol. iii., fasc. 3, vol. iv., fasc. 1.
VAN DEN HEEDE, A. (2) "Les Begonia, Culture et Monographie."
VILLE, G. (2) "On Artificial Manures, their Chemical Selection and Scientific Application to Agriculture," transl. and ed. by W. Crookes.
VINES, S. H. (2) "A Student's Text-Book of Botany."
" (2) "An Elementary Text-Book of Botany."
VRIES, HUGO DE (2) "Die Mutationstheorie," Bd. ii., Lief. 2 & 3.
WARD, C. W. (2) "The American Carnation: how to grow it."
WARINGTON, R. (2) "Chemistry of the Farm."
WATSON, W. (2) "Orchids: their Culture and Management.' New edition, by H. Chapman.
Woburn Experimental Fruit Farm" (7) Third Report.



DONORS OF SEEDS, PLANTS, &c., TO THE SOCIETY'S GARDENS AT CHISWICK DURING THE YEAR 1903.

Andrews, R., Holmesdale Road, Bromley, Kent. A new water sprinkler. See p. 583.

Appleby, Colonel, Woodside, Lymington. Seeds of Runner Beans. See p. 202.

Atkinson, J., Lazonby R.S.O., Cumberland. Seed Potatos. See p. 557.

Bache, J. S., St. Gluvias Street, Penryn. Seed Potatos. See p. 557.

Baker, W. G., Botanic Gardens, Oxford. Seeds of Palms, &c. Will be distributed as plants to Fellows.

Barr, Messrs., Covent Garden. Seeds of Poppies, Peas, Beans, Tomatos, Vegetable Marrows, and a New Bulb Planter. See pp. 191, 195, 200, 203, and 582.

Beddome, Colonel, West Hill, Putney. Seeds of *Ipomœa rubro-cærulea*, and corms of *Achimenes longiflora*. Distributed as plants to Fellows.

Bennett-Poë, J. T., Homewood, Cheshunt. Plants of *Nephrolepis Duffii* for stock.

Bird, Rev. M. C. H., Brunstead Rectory, Stalham. Seeds of Brussels Sprouts. Received late, and will be tried in 1904.

Blackmore & Langdon, Messrs., Bath. Begonia tubers. See p. 569.

Boehmer, Messrs., 5 Bluff, Yokohama. Seeds of *Ipomœa hederacea* and *Dolichos cultratus* (purple and white). Plants very similar to *Dolichos*, in growth and foliage.

Bonavia, Dr., Westwood, Worthing. Two plants of Oleanders, and seeds of *Hibiscus esculentus*. See p. 577.

Bond, G., High Ashurst, Dorking. Seed Potatos. See p. 557.

Booth, W., Howsham, Lincoln. Seed Potatos. See p. 557.

Bovrill, A., Puerto de la Cruz, Tenerife. Seeds of a white-fruited Guava. Plants will be distributed to Fellows.

Bradley, F. M., Church Street, Peterborough. Seed Potatos. See p. 557.

Bristow, T., Marfield Cottage, Tonbridge. Seed Potatos. See p. 557.

Bromet, H., Tadcaster. Dracæna plants for stock.

Brown, J., Trinidad. Unnamed Pancratiums. All that have flowered were *P. fragrans*.

Brunton, Miss, Bulwer Road, Leytonstone. Seeds of a Pink Creeper. This proved to be *Lithospermum scandens*, and will be distributed to Fellows.

Bullar, Mrs. G. E., Southampton. Seeds from Ceylon. All germinated very badly.

Bunn, W., Colwall, Malvern. Seeds of Tomato 'Superlative.' See p. 554.

Burdett, F. I., Scotswood, Sunningdale. Plants of Viola 'Maggie Mott.'

Campbell, R., Water Street, Manchester. Patent Sulphur Vaporiser. See p. 584.

Carew, Lord, Belgrave Square, S.W. Seed Potatos. See p. 557.

Carters, Messrs., High Holborn, W.C. Pea, Tomato, Radish, and Vegetable Seeds. See p. 193, and pp. 554 and 576.

Champion, Messrs., City Road, E.C. Ornamental oak tubs. See p. 583.

Champneys, Rev. W., Rotherfield, Sussex. Aster, and Cactus Dahlias. See p. 562.

Chandler, A., Torquay. Patent labels. See p. 582.

Cheal, Messrs., Crawley, Sussex. Cactus Dahlias. See p. 562.

Clark, F., Hazel Gap, Newark. Seed Potatos. See p. 557.

Climpson, A. J., Harpenden, Herts. Label-holder and labels. See p. 582.

Coleman, F. F., Sandown Road, Sandwich. Seed Potatos and Peas. See p. 194 and p. 557.

Colton, G., Victoria Works, Holmes Chapel. Patent Tray Fuel Economiser.

Cooper, Taber, Messrs., 90 and 92 Southwark Street, E.C. Seed Potatos and Peas. See p. 197 and p. 557.

Crook, J., Forde Abbey Gardens, Chard. Seeds of Runner Beans, Cauliflower, and Araucaria. See p. 202 and p. 576.

Dammann, Messrs., Naples. Seeds of Cauliflowers. See p. 576.

Daniels, Messrs., Norwich. Seeds of French Beans, Peas, and Potatos. See pp. 194, 200 and p. 557.

Dean, A., Richmond Road, Kingston, S.W. Seeds of French Beans. See p. 199.

Dean, R., Ranelagh Road, Ealing. Seeds of French Bean. See p. 202.

Dehman, J., Much Hadham. Seeds of a White Turnip. Received late, and will be tried in 1904.

Dickson & Robertson, Old Mill Gate, Manchester. Seeds of Lettuce. Received late, and will be tried in 1904.

Director, Botanical Garden, Jamaica. Palm seeds. Plants will be distributed to Fellows.

Director, Royal Gardens, Kew. Seeds and small Palms. Plants distributed to Fellows.

Dobbie, Messrs., Rothesay. Seeds of Dwarf and Runner Beans, Potatos, Poppies, Antirrhinums, Red Cabbage, and plants of Violas. See pp. 190, 199, and p. 557. The Violas and Red Cabbage will be tried at Wisley.

Doig, Colonel, Rose Mount, Wych Hill, Woking. Seeds of *Erythrina arborescens*. Plants are being grown on.

Dyer, W. H., Frimley, Surrey. Seeds of Tomatos. See p. 554.

Edwards, W. W., Mayford, Weybridge. Seeds of Vegetable Marrow. See p. 203.

Ellington, W., Mildenhall, Suffolk. Seed Potatos. See p. 557.

Elwes, H. J., Colesborne Park, Gloucester. Seeds of *Acer Trautvetteri* and *Pterocarya caucasica*. Plants of the latter will be distributed to Fellows; the former failed to germinate.

Fincham, H., Cranbrook. Seed Potatos. See p. 557.

Forbes, J., Hawick. Plants of Antirrhinums, Pentstemons, and Phlox. See p. 568.

Fox, C., New Clive Road, West Dulwich. Sample of manure. See p. 583.

Gammie, J., Grosvenor Road, Gunnersbury. Seeds from Calcutta. Plants distributed to Fellows.

Gauntlett, V. N., Green Lane, Redruth. Plant of *Rhododendron Gauntletti*. Planted out at Chiswick.

Gledstanes, F. G., Manor House, Gunnersbury. Croton cuttings. Plants will be distributed to Fellows.

Godfrey, W. J., Exmouth. Border Chrysanthemums. See p. 568.

Goody, J., Clare, Suffolk. Seeds of Peas, Onions, and hardy Melons and Cucumbers. See p. 196 and p. 576.

Guildford Hardy Plant Co., Guildford. Plants of *Aster*, *Saxifraga*, and *Arrhenatherum*. All are growing in the Society's collections.

Hadley, E. B., Strand, W.C. Three sacks of manure. See p. 583.

Hall, J. M., Pontardulais. Seeds of Peas and Onions. See p. 197.

Harrison, Messrs., Leicester. Seeds of Peas, Dwarf Beans, Lettuce, Radish, Cabbage, &c. See pp. 194, 200, and p. 576.

Heinemann, F. C., Erfurt. See p. 201.

Henkell, H., Gartenardilekt, Darmstadt. Plants of *Sagittaria*, *Agave aurea*, and *Hechtia montana*, all of which are being grown on.

Hill, D., Herga, Watford. Seeds of *Gentiana lutea* and *Nicandra physaloides*. Both will be grown on.

Hobbies, Messrs., Dereham, Norfolk. Cactus Dahlias and Violas. See p. 562. The Violas are being grown at Wisley.

Hobday, S., Romford, Essex. Seeds of Peas. See p. 195.

Hogg & Robertson, Mary Street, Dublin. Seeds of Tomatos and Potatos. See pp. 554 and 557.

Holmes, R., Tuckswood Farm, Norwich. Seeds of Tomatos. See p. 554.

Horne, J., St. Clements, Jersey. Seeds of *Clianthus puniceus*. Received late.

Howcroft & Watkins, Messrs., Floral Street, Covent Garden, W.C. Manure. See p. 583.

Hudson, J., Gunnersbury House, Acton. Dracæna stems.

Hull Chemical Co., Hull. Insecticides and Sprayer. See p. 582.

Humphrey, C. M., Enfield, Middlesex. Fifteen packets of Seeds. Received late.

Hurst, Messrs., Houndsditch, E.C. Seeds of Peas, Vegetable Marrows, Tomatos, and Potatos. See pp. 197, 203, and pp. 554 and 557.

Izquierdo, S., Santa Ines, Chili. Seeds of *Placea lutea*. Failed to germinate.

Jones, E. A., Leadenhall Street, E.C. Patent drainage crocks. See p. 582.

Kay, A., Barrowgate Road, Chiswick. Fern spores from New Zealand. Failed to germinate.

Kent, S., Norbury Park Gardens, Dorking. Seeds of Climbing French Beans and Potatos. See p. 201 and p. 557.

Keynes, Williams, Messrs., Salisbury. Cactus Dahlias. See p. 562.

Knight, J., Vernon House, Farnham. Seeds of *Phormium tenax*, *Clianthus*, and some unnamed seeds. The two former will be distributed to Fellows.

Lawrence, Sir Trevor, Burford, Dorking. Seeds of Incarvilleas, *Eremurus*, and Delphiniums. Plants will be distributed to Fellows.

Laxton, Messrs., Bedford. Seeds of Peas, Potatos, and Tomatos. See p. 193 and pp. 554, 557.

Le Sueur, R., Montague Place, Russell Square, W.C. Unnamed Nerines. Will be distributed to Fellows.

Lloyd, F. G., Langley House, Langley. Plants of *Arabis alpina* fl. pl.; and two plants of *Rubus moluccanus*. For stock.

Low, H., Messrs., Bush Hill Park, Middlesex. Seeds of *Schizanthus*. See p. 568.

Ludwick, Major, Charing Cross, W.C. Seeds of a Gourd and a bulbous plant. See p. 576. The seeds of the bulbous plant failed.

Lynch, R. J., Botanic Gardens, Cambridge. Collection of seeds, plants of which will be distributed to the Fellows.

Mathews, H., Market Square, Longton. Seed Peas. See p. 197.

Meredith, Rev. T., Tibberton Rectory, Newport, Salop. Plants of Hybrid Pelargoniums. Being grown on.

Morrison, W., Duncraig, Plockton, N.B. Seed Potatos. See p. 557.

Mortimer, S., Farnham, Surrey. Cactus Dahlias. See p. 562.

Nix, J. A., Tilgate, Crawley. Dracæna stems. For stock.

Noel, Miss E. F., Lamcote, Radcliffe-on-Trent. Fifteen packets of seeds. Plants distributed to Fellows.

Nutting, Messrs., Southwark Street, E.C. Seeds of a Dwarf French Bean. See p. 201.

Parr, H., Trent Park Gardens, Barnet. Seeds of Tomato. See p. 554.

Peake, Mrs., Westbrook, Newbury. One packet unnamed seeds which failed to germinate.

Robson, J., Hale Road, Altrincham. Four plants of *Bouvardia* 'King of Scarlets.' For stock.

Rose, Messrs., Runhall, Hardingham. Eight plants of Tomatos, which proved a good variety.

Sandeman, Colonel J. G., St. Swithin's Lane, E.C. A box of mixed unnamed Palm seeds. Plants will be distributed to Fellows.

Saunders, Messrs., Gloucester. Seed Potatos. See p. 557.

Scarlet, T. A., Market Street, Edinburgh. Seed Potatos. See p. 557.

Sharpe, C., Messrs., Sleaford. Seeds of Peas, French Beans, Potatos, Tomatos, and Vegetable Marrow. See pp. 193, 199, 203, 554, 557.

Shawyer, S., Cranford, Middlesex. Seeds of Tomatos. See p. 554.

Sheath, W. W., Ventnor, I.W. Seeds of *Dracæna australis*. Failed to germinate.

Skelton, E., Townsend Terrace, Richmond, S.W. Plant of Aster 'Thomas Wilks.' Planted in the collection.

Slade, T. H., Poltimore, Exeter. Plants of Begonia 'Abundance.' For stock.

Smith, J., Mentmore, Leighton-Buzzard. Seed Potatos. See p. 557.

Southal, H., The Craig, Ross. Plant of Aster 'Miss Southal.' Planted in the collection.

Sowman, A., Tower Churchyard, Ipswich. Seed Potatos. See p. 557.

Sutton, Messrs., Reading. Seeds of Peas, Beans, Vegetable Marrows, Tomatos, and Potatos. See pp. 193, 199, 203, 554, 557.

Sydenham, R., Tenby Street, Birmingham. Seeds of Sweet Peas, and seeds and corms unnamed. The latter are being grown on.

Thomas, T. J., Abernant Gardens, Aberdare. Seeds of Potatos and Tomatos. See pp. 554, 557.

Thompson, R. S., Taranaki, New Zealand. Seeds of *Cordyline indivisa*. Plants distributed to Fellows.

Titterington, I., Ribbleton, Preston. Seed Potatos. See p. 557.

Treseder, W., Cardiff. Plants of Cactus Dahlias. See p. 562.

Turnbull, T. S., The Woodlands, St. Anne's-on-Sea. Dracæna stems.

Veitch, J., Messrs., Chelsea. Seeds of Poppies, Beans, Peas, Manure, and plants of Iris. See pp. 183, 190, 193, 199, and 203. The Irises are included in the collection.

Veitch, R., Exeter. Seeds of Peas, Beans, Potatos, Tomatos, Cauliflower, and Onions. See pp. 193, 199, 554, 557, 576.

Warburton, J. W., Rostrevor, Ireland. Seeds of *Arbutus Menziesii*. So far have failed to germinate.

Ware, Messrs., Fulham. Plants of Iris. Included in the collection.

Watkins & Simpson, Messrs., Tavistock Street, Covent Garden, W.C. Seeds of Poppies, Antirrhinums, &c. See pp. 190, 568.

Webb, Messrs., Stourbridge. Seeds of Peas and Tomatos. See p. 196 and p. 554.

Wheatley, S. W., Butterton, Newcastle. Plants of Crotons and Dracænas. For stock.

White, J., Messrs., Monkwell Street, E.C. American Transplanter. See p. 582.

Wibaille, P., Hôtel des Bains, Wimereux, Boulogne. *Sedum maritimum*. For stock.

Wiles, E. S., The Rookery, Down, Kent. Seed Potatos. See p. 557.

Wilks, Rev. W., Shirley Vicarage, Croydon. Hardy Vine cuttings, also *Datura* (*Brugmansia*) *arborea* and bulbs of *Zephyranthes carinata*. Will be distributed to Fellows.

Willing, Mrs., Rock Hall, Teddington. Seeds of 'Silver Leaf' from S. Africa. Not yet germinated.

Willmott, Miss, Warley Place, Great Warley. Two parts of 'Index Kewensis' Supplement.

Wythes, S., Syon House, Brentford. Seeds of Vegetable Marrow, Beans, and Potatos. See p. 201, 203, and pp. 557.

NOTES ON RECENT RESEARCH

AND

SHORT ABSTRACTS FROM CURRENT PERIODICAL LITERATURE, BRITISH AND FOREIGN,

AFFECTING

HORTICULTURE

AND

HORTICULTURAL AND BOTANICAL SCIENCE.

Judging by the number of appreciative letters received, the endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural and Botanical periodical literature, has met with success. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to all who have helped in the work all the more hearty.

The Editor desires to express his most grateful thanks to all who co-operate in this work for the very large measure of success already attained, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* can alone enable the Editor to continue to cope with the work. The order agreed on was as follows :—

1. To place first the name of the plant, disease, pest, &c., being noticed; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal &c. in which the original article appears, taking care to use the abbreviation which will be found on pp. 614, 615.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP IN THIS WORK.

Boulger, Professor G. S., F.L.S., F.R.H.S.
Bowles, E. A., M.A., F.L.S., F.E.S., F.R.H.S.
Burbidge, F. W., M.A., V.M.H.
Chapman, H., F.R.H.S.
Chittenden, F. J., F.R.H.S.
Cook, E. T., F.R.H.S.
Cooke, M. C., M.A., LL.D., A.L.S., F.R.H.S., V.M.H.
Cox, H. G., F.R.H.S.
Dean, R., V.M.H., F.R.H.S.
Dod, Rev. C. Wolley, M.A., F.R.H.S., V.M.H.
Druery, C. T., V.M.H., F.L.S., F.R.H.S.
Farmer, Professor J. B., M.A., F.R.H.S.
Goldring, W., F.R.H.S.
Groom, Professor Percy, M.A., D.Sc., F.L.S., F.R.H.S.
Hartog, Professor Marcus, D.Sc., M.A., F.L.S., F.R.H.S.
Hawes, E. F., F.R.H.S.
Hay-Currie, C., F.R.H.S.
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, M.R.A.C., F.R.H.S.
Houston, D., F.L.S., F.R.H.S.
Hurst, C. C., F.L.S., F.R.H.S.
Kent, A. H., A.L.S., F.R.H.S.
Lynch, R. Irwin, A.L.S., F.R.H.S.
Massee, Geo., F.L.S., F.R.H.S.
Mawley, Ed., F.M.S., F.R.H.S.
Moulder, Victor J., F.R.H.S.
Newstead, R., A.L.S., F.E.S., F.R.H.S.
Percival, Professor John, M.A., F.L.S., F.R.H.S.
Rendle, A. B., M.A., D.Sc., F.L.S., F.R.H.S.
Reuthe, G., F.R.H.S.
Saunders, Geo. S., F.L.S., F.E.S., F.R.H.S.
Scott-Elliot, G. F., M.A., B.Sc., F.L.S., F.R.H.S., F.R.G.S.
Shea, Charles E., F.R.H.S.
Shinn, C. H., F.R.H.S.
Smith, William G., B.Sc., Ph.D., F.R.H.S.
Veitch, Harry J., F.L.S., F.Z.S., F.R.H.S.
Ward, Professor Marshall, Sc.D., F.R.S., F.R.H.S.
Webster, A. D., F.R.H.S.
Worsdell, W. C., F.R.H.S.

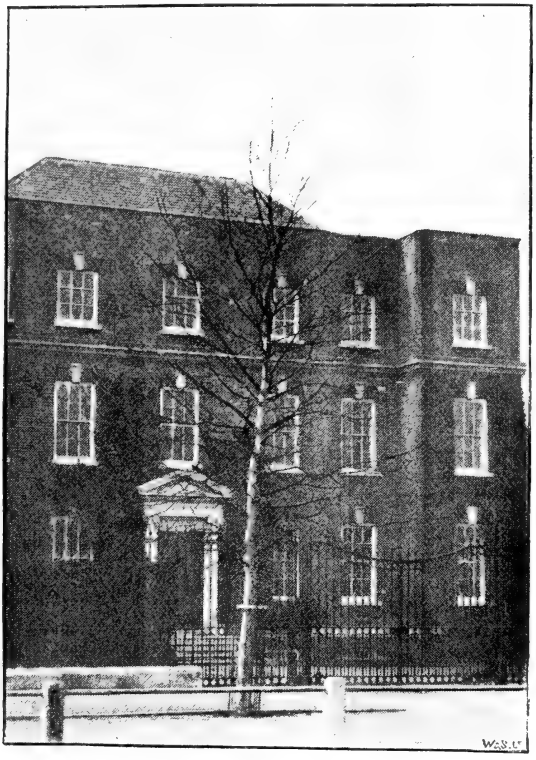
JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used for their titles.

Journals &c.	Abbreviated title.
Acta Horti Petropolitani	Act. Hort. Pet.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
American Gardening	Amer. Gard.
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 Botany	Ann. Bot.
Beihefte 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.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Botanische Zeitung	Bot. Zeit.
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.
Bulletino della R. Società Toscana d' Orticultura	Bull. R. Soc. Tosc. Ort.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chambers's Journal	Chamb. Jour.
Chronique Orchidéenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Contributions from the Botanical Laboratory, University of Pennsylvania, Philadelphia	Contr. Bot. Lab. Phil.
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.
Flora	Flora.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr. W.I.
Journal of Botany	Jour. Bot.
Journal of Horticulture	Jour. Hort.
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 S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
Kew Bulletin	Kew Bull.
Le Jardin	Le Jard.
Lindenia	Lind.
Nature	Nature.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. König. Bot. Berlin.

Journals &c.	Abbreviated title.
Orchid Review	Orch. Rev.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Queensland Agricultural Journal	Qu. Agr. Journ.
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	Garden.
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.
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.†
Wiener Illustrirte Garten-Zeitung	Wien. Ill. Gart.-Zeit.
Woburn Experiment Farm Report	Woburn.
Zeitschrift für Pflanzenkrankheiten	Zeit. f. Pflanz.

* 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.

Acer platanoides Wittmackii, Schwerin (*Gartenflora*, 1/7/03, p. 337, pl. 1516).—A short description and coloured plate of the plant. The leaves have peculiar outgrowths here and there along the edges, of a darker tint than the rest of the leaf-blade.—*J. P.*

Acianthus amplexicaulis. By R. A. Rolfe (*Orch. Rev.* Nov. 1903 p. 344).—Its native habitat and proofs of identity are included in these particulars.—*H. J. C.*

Aconites, The. By W. Irving (*Gard.* p. 339; 14/11/03).—This extensive genus is entirely confined to the northern hemisphere, the species being chiefly European and Northern Asiatic, while a few are found in North America. The nomenclature is in some confusion, owing to the great number of names and various opinions of different authorities. This valuable article gives full cultural details, and describes at length all the species.—*E. T. C.*

Æsculus parviflora. By A. Herrington (*Gard.* p. 299; 2/5/03).—A beautiful shrub in leaf and habit of growth, and its late period of flowering, from July into August, gives it additional value. Where the area permits of its being boldly grouped it can be effectively planted, and a mass of it makes a striking foliage feature from spring till autumn; while in its flowering season it is exceedingly handsome, each shoot being terminated by an erect spike of flowers lasting from three to five weeks.
E. T. C.

Æthionemas, The. By W. Irving (*Gard.* p. 394; 5/12/03).—A genus of low-growing plants, containing about 50 species, distributed over the countries of Europe bordering on the Mediterranean. They are essentially rock plants and are easily raised from seed; they should be planted in a sandy loam to which a proportion of lime in some form has been added. Full descriptions are given of the various species.—*E. T. C.*

Agapetes Moorei. By W. B. Hemsley (*Bot. Mag.* tab. 7928).—Nat. ord. *Vacciniaceæ*, tribe *Thibaudieæ*. Native of Sikkim. A handsome shrub, with scarlet flowers 1–1½ inch long; racemes 6–9 flowered.
G. H.

Agave Parryi. By L. Graebener (*Die Gart.* p. 49, October 31, 1903). This new introduction stood last winter unprotected 15° Celsius in Germany without injury. The succulent leaves are glaucous, and when fully developed attain a length of 1 to 1·30 mètres; the spines are dark brown. The scape attains a height from 3 to 4 mètres and bears a number of greenish-yellow flowers. From the San Francisco and Mogolones mountains of North America at an altitude of 2,135 mètres (about 7,000 feet).—*G. R.*

Agricultural Production in the United Kingdom, Economic Conditions of. By Albert Dulac (*Ann. Agr.* vol. xxviii., Nos. 3 & 8, March and August 1902).—An excellent essay dealing with the incidence of imperial and local taxation on agriculture, rent, social conditions, soil, climate, crop and animal production, cost of production.—*C. H. H.*

Ajugas. By S. Arnott (*Gard. Mag.* No. 2597, p. 528; 8/8/03).—The modest little genus *Ajuga* numbers a few beautiful border plants. Several species and varieties are described in this article, which is illustrated by the pretty *A. Brockbanki*, one of the best varieties.—*W. G.*

Albinism in Maize. By B. D. Halstead (*U.S.A. Exp. Stn. New Jersey, Rep.* 1902, pp. 409–412; plate).—Experiments to show the influence on the production of albino seedlings of the amount of moisture given during germination, and of the source of seed, whether from ill-developed ears, from albino ears, twin ears on a stalk, or from inbred or wide-bred corn. The experiments, which were not sufficiently extensive to yield reliable results, point to close fertilisation as a cause, and it is recommended that plants from which it is intended to save seed should have male inflorescences removed.—*F. J. C.*

Algæ, Remarks on the Periodical Development of, in the Artificial Waters at Kew. Note by F. E. Fritsch (*Ann. Bot.* vol. xvii. No. lxv. p. 274; January 1903).—All who are concerned with fresh-water Algæ must be interested in this paper.

"Whilst working out the algal flora of the Royal Botanic Gardens at Kew for publication by the authorities, I have made several observations on the periodicity of the flora which I wish to remark upon more fully here. The flora was found to be built up of a hot-house element, consisting for the greater part of *Cyanophyceæ*; of the Thames element due to the universal use of river-water throughout the gardens; and lastly of the open-air terrestrial element."

In a footnote we are informed that "a large number of the blue-green *Algæ*, which occur in the moist heat of greenhouses, have also been observed in hot springs of different parts of Europe, notably those of Carlsbad; this seems to show that they are not truly indigenous in Europe, but can only exist under the peculiar conditions (*i.e.* high temperature and moisture) found at these particular spots. . . . The hot-house flora is practically equally developed during the whole year, the conditions under which it exists remaining uniform. The flora outside, however, shows quite a different character in the winter and in the summer, and attains its maximum development in August and September. . . . In all the artificial waters at Kew a regular sequence of forms was observed; it was most pronounced in the Aquatics' tank near the Jodrell Laboratory, in which, by the removal every now and then of the mass of Algæ that collects there, room is constantly being furnished for the development of other forms. . . . *Oscillaria nigra* also played an important part in the Water-Lily pond. In the earlier part of the year a *Cladophora* was the most abundant here, and no trace of *Oscillaria* was to be found. During the summer months the latter genus, however, attained an enormous development, the whole bottom of the pond being covered with a thin

blue-green film from which dense, almost black, masses of various shapes stood up vertically in the water." Useful tables are given, one illustrating the periodical development of *Algæ* in the tank near the Jodrell Laboratory, and another dealing with the same subject for the lake. It is at once seen that of the species enumerated only two are present throughout all of the nine months that are included. These are *Spirogyra crassa* in the tank by the Jodrell Laboratory and *Aphanochæte repens* in the lake.

R. I. L.

Allium albopilosum. Anon. (*Gard. Chron.* No. 864, p. 34, & fig. supplement, July 18, 1903).—This fine species was discovered by Sintenis in 1901, growing on the mountain range that divides Transcaspia from Persia. The flower-spike is about a foot in height, and bears an umbel of about eighty flowers, which is about eight inches in diameter, the individual blossoms being nearly two inches in diameter. They "resemble a star with narrow rays; their colour is a deep lilac with a metallic sheen." "The leaves are glabrous on the upper surface, but furnished on the lower and margins with many scattered white hairs, whence the specific name. A botanical description of the plant is given in Latin.—*G. S. S.*

Aloe Cameroni. By W. B. Hemsley (*Bot. Mag.* tab. 7915).—Nat. ord. *Liliaceæ*, tribe *Aloineæ*. Native of Eastern Tropical Africa. This is an erect shrub with unbranched stem. Flowers almost cinnabar-red, yellowish above, pendulous.—*G. H.*

Alpine Floral Effects, How to Produce, in large Gardens and Parks. By Ed. André (*Rev. Hort.* October 16, 1903, pp. 469–72; November 1, 1903, pp. 493–4; and December 1, 1903, pp. 541–4).—A very interesting series of articles on the principles to be followed in the establishment of Alpine flowers or mosses &c. on an extended scale, also a list of suitable plants. The general idea is the formation in gentlemen's parks of large areas sown, rather than planted, with the Alpine flowers which afford such broad and splendid effects in their native fields.—*C. T. D.*

American Florists' and Ornamental Horticulturists' Society (*Proceedings of 19th Annual Convention, Aug.* 1903).—The society held its annual convention at Milwaukee, Wisconsin, U.S.A., when the following papers were read: "Floriculture at the St. Louis Exhibition," "Latest Advances in Greenhouse Construction," "Decoration of Home Grounds," "Floral Decoration," "Government Aid for Horticulture," "Violet Culture in the West," "Substitutes for Coal" ("coal is the cheapest and best fuel that the market affords"), "Humorous Side of the Florists' Business," "A System of Accounts for Greenhouses, &c." The meetings, which extended over four days, were interspersed with concerts, sports, &c. The society includes florists from most of the States, and in each State there is a vice-president, who presents a report at the convention. One point is particularly worthy of notice. A "Pæony Committee" was formed, with power to add to its numbers. This power was interpreted in such a way that all members of the society who were interested in Pæony cultivation were included in the committee, thus forming a small special society under the main one. This action seemed to meet with great and general approval.—*F. J. C.*

Androsaces, The. By Henry Correvon (*Gard.* p. 332, 16/5/03; p. 351, 23/5/03; p. 370, 30/5/03; p. 391, 6/6/03; illustrated).—Of all the plants of the mountains none are more closely tufted or more completely alpine in their appearance and character than the genus *Androsace*. One may say they are the most alpine of alpines, and that they may be taken as the most characteristic type of the flora of the mountain heights. Low of growth, brilliant of aspect, extremely pretty, and covered with bloom, they are the purest of the jewels of alpine vegetation.—*E. T. C.*

Anemone polyanthes. By W. Irving (*Gard.* p. 43; 18/7/03).—Somewhat resembling the European *A. narcissiflora*, but of more robust habit, the Himalayan *A. polyanthes* is a common plant in Kashmir and Sikkim at elevations of 10,000 and 12,000 feet. It is usually found growing in moist, shady places. A similar position should be selected for it in the rock-garden. The large white flowers are sometimes 2 inches in diameter, borne in compound umbels of often twenty flowers on stout petioles some 20 inches high.—*E. T. C.*

Annuals, The Use of. By Hugh A. Pettigrew (*Gard.* p. 331; 16/5/03).—By a generous and constant use of annuals and certain perennials it is easy to alter the whole tone of a garden and give it an entirely different complexion summer after summer. To be effective, as every lover of these flowers knows, they must be used more or less freely in masses, and discrimination exercised in the grouping of colours.

E. T. C.

Anthogonium gracile. By R. A. R. (*Orch. Rev.* Nov. 1903, p. 343).—Descriptive particulars of this Bletia-like Orchid and its habitat are included.—*H. J. C.*

Aphanomyces, Development of the Spores of. By W. Rothert (*Flora*, vol. xcii. 1903, pp. 293–301; 7 cuts).—The base of the sporange is usually within the substratum, so that the septum is rarely seen; it is thickish, refractive, and convex to the sporange. The formation of the spore origins takes place by localised thickenings of the parietal plasma, which finally meet across the lumen, and are thus cylindrical, united by tubular continuations lining the sporange wall. A short stage of relative homogeneity follows, due here as elsewhere to some localised plasmolysis, and is at once succeeded by contraction away from the wall and segmentation into a line of cylindrical bodies, united by the filaments due to the contraction of the intersporal tubes; these axial filaments grow thinner by retraction of their substance into the spores, but persist until discharge. No contraction of the sporange (save a shortening of 1 : 300–400 in one instance), nor bacterial dance was certainly made out. Discharge takes place thus: the front spore presses forward, pushes a moment against the apical wall, and squeezes through an apparently very fine opening; the others in succession do the same, the rate of discharge progressively slackening and the last one or two often remaining behind. The spores narrow and lengthen as they approach the slender end of the sporange, always leaving a space between themselves and the wall. The distance between successive spores augments during the forward movement. [All this the abstractor has seen and confirms.] The expulsion of the spores

is essentially passive and due to a substance within the sporange wall capable of swelling and so expelling the spores, aided by their connecting axial filaments. This substance is even more clear in *Achlya*. [As the sporangial wall is freely permeable to water, such a swelling substance might expel the first spore but not the others; as shown years ago, the swelling substance, undemonstrable by any reagent, does not provide a mechanism that accounts for the facts.] The spores, sausage-shaped on their escape, round off and encyst in the well-known hollow-spherical aggregate, as in *Achlya*. Hartog ascribes this to mutual attraction ("adelphotaxy") in *Achlya*, the species which he and Cornu [and all other observers save Rothert] examined being flagellate. But *Aphanomyces* clearly has no flagella, any more than Rothert's *Achlya*. The aggregation must be due to the connections by the plasmatic filaments and the viscid surface of the spores and the pressure of the expulsive substance. [We have never seen a hollow sphere formed in *Aphanomyces*, but a subspherical solid heap of the encysted spores. If the plasmic connections were functional, as they are diametrically opposite, the aggregate would be a string; if the viscid surface, the spores would form a mass of polyhedra, not of spheres.] The zoospores escape shortly (say 2½ hours) after from the cyst in the normal kidney shape with two flagella. "Cuttings" of *Aphanomyces* are as useful as those of other *Saprolegnieæ*.—*M. H.*

Apple Culture, Some Suggestions concerning (*U.S.A. Exp. Stn. Ohio, Bull.* 137, Feb. 1903).—Some short but useful suggestions on some of the most important questions which have arisen under conditions such as obtain in Ohio. The steady increase of destructive insects and fungi has made a study of these forms of life necessary, and this has resulted in great progress in methods of protecting the Apple crop, and conservation of soil moisture has been proved to be of much importance for the maintenance of fertility. As a site for an Apple orchard, elevated ground is recommended, and fairly fertile clay loam is stated to be about the best soil. Beech, Oak, and Chestnut lands are suitable for Apple orchards, but not Elm land. As a result of experiment it has been found that the trees should be planted from 25 to 40 feet apart, and no fillers used, as they are likely to do more harm than good. Draining is essential to the life and health of Apple trees, and, if not natural, it is best secured with tile drains. Manuring, cultivation, and cover-crops are fully dealt with. It is truly stated that so much has been said about the necessity for spraying that there is danger of forgetting that trees need food as well as medicine. It is advocated that during the first three or four seasons some cultivated crop, such as Corn or Potatos, can be grown between the trees to advantage. Wheat, Oats, Barley, Rye, or any sown crop, if allowed to mature, deprives the soil of so much moisture as to affect the trees injuriously, hence such crops should not be grown.

On hilly ground, in fact wherever cultivation is difficult, and on soil which washes, and where grass can be made to grow, the grass mulch method is advised. Spraying is of course stated to be a matter of great importance, and must go hand in hand with other essential operations. Directions are given for making spraying mixtures, such as Bordeaux mixture and ammoniacal solution of copper carbonate.—*V. J. M.*

Apple Orcharding, Commercial. By G. B. Brackett (*U.S.A. Dep. Agr. Year Bk.* 1901, p. 592; plates).—It is stated that the Apple has not until recent years been grown in commercial quantities of magnitude in the States. The vast progress and development of Apple culture now places this industry in the front rank of commercial resources. The magnitude of the crop has become such that houses and storerooms, refrigerators, evaporators, and places for expressing the juice have been constructed at all points in fruit regions as required for economic disposition of crops. Dealing with soil, it is said that with a free subsoil underlying it a loamy clay soil will probably yield the best results, especially if it be well prepared by thorough cultivation and subsoiling before planting. Nearly all lands for orchards should have both thorough surface drainage and sub-drainage. No orchard will endure for a great length of time with stagnant water either upon the surface or within the soil. The autumn months are generally regarded as the best time to prepare all lands that are designed for Apple orchards. A good plan is to back-furrow the land so as to leave the dead furrow where the rows of trees are to stand, thus leaving it in a condition for the ameliorating effect of frost. If the land selected is not in a fertile condition at time of ploughing, it should be enriched with thoroughly rotted stable manure spread broadcast over the land before it is ploughed. Valuable hints are given as to selection of the varieties to be grown. It is recommended that only a few varieties be chosen. One of the most common mistakes made by the commercial apple orchardists is in planting too many varieties. Cultivation, pruning, insects, and diseases are dealt with, as also the handling and disposition of the crops. From the very beginning of the planting the grower must exercise incessant vigilance and warfare on the numerous insect enemies and diseases to which the fruit is subject. The greatest enemy to Apple culture is the codlin moth, which is more difficult to combat than most other insects. Spraying with some of the arsenites is the principal remedy and prevention now in use, but this alone is not a perfect success. Nature steps in to assist man in checking the increase of this insect by introducing its enemy the Ichneumon fly. This fly lays its eggs in the codlin moth, and the eggs hatch out grubs which kill the insect.—*V. J. M.*

Apple Rot following Scab. By John Craig and J. M. Van Hook (*U.S.A. Exp. Stn. Cornell Univ., Bull.* 207; xi. 1902, figs.)—Contains little additional information concerning the pink rot of Apples following scab, caused by *Cephalothecium roscum* Corda, noted in abstract from a similar bulletin in Journ. R.H.S. xxviii. p. 233.—*F. J. C.*

Apples, American and Canadian. By E. Bartrum, D.D. (*Gard. Mag.* No. 2617, p. 860; 26/12/03).—The writer discusses the merits of the various Apples which are exported from America, and compares them with English varieties. The first position in point of merit is rightly given to Newtown Pippin, which, unfortunately, cannot be profitably grown in this country.—*W. G.*

Apples in Maine. By W. M. Munson (*U.S.A. Exp. Stn. Maine, Rep.* 1902; pp. 81–96).—This report gives, under the title of "Orchard

Notes," descriptions and notes upon the hardy Apples of Maine, together with some remarks upon the keeping qualities of certain varieties. The varieties 'Wealthy,' 'Alexander,' and 'Oldenburg' are recommended for market purposes and it is stated that 'Wealthy' commands a ready sale in London and Liverpool in autumn, while the others named are much appreciated in Boston and England. Of the fifty varieties of Russian Apples tried, few are recommended, for they are of "poor quality, early season," and in the "habit of dropping before maturity."—*F. J. C.*

Apples, old and new. By E. Bartrum, D.D. (*Gard. Mag.* No. 2603, p. 626; 19/9/03).—A series of articles by Dr. Bartrum, who describes the varieties in a popular way, and introduces interesting facts concerning the origin of those he includes in his selection.—*W. G.*

Apples, Thinning. By S. A. Beach (*U.S.A. Exp. Stn. Geneva, N.Y., Bull.* 239, 1903).—Experiments were carried out in thinning Apples during June and July over a period of four years. Thinning was practised on all trees carrying anything resembling a crop. In heavy crops thinning improved size, colour, and market value, but did not appear to have any effect on the regularity or amount of production. The method of thinning was to remove all fruit by hand, selecting only the finest specimens to remain and mature. It appears that in all cases early thinning (some three or four weeks after the fruit is set) gives the best results. According to Mr. Wilson, in whose orchards the experiments were made, it pays only to thin when there is a full crop and by this means reduce what would at maturity be inferior produce only.—*E. F. H.*

Apples, Two Decays of Stored. By H. J. Eustace (*U.S.A. Exp. Stn. New York, Bull.* 235, 7/1903; 4 plates).—A decay of stored Apples caused by *Hypochnus* sp. ? following Apple scab is noted. The decay is similar to that caused by *Cephalothecium roseum* (see JOURN. R.H.S. xxviii. p. 233) except that the fungus is not at first conspicuous on the affected spots; it affects the Apple finally almost to the core, and does not produce so bitter a taste. 'Rhode Island' Greening' and 'Baldwin' were the varieties affected, but inoculation experiments proved that the fungus would grow on other varieties of Apple and on Pear. The fungus is a wound parasite and affects the fruit only through wounds, particularly those caused by the Apple scab fungus. Persistent spraying for the prevention of Apple scab is recommended. In the second rot the Apple was apparently quite sound, but it was found that the core was decayed, being dry, rotten, and tasteless. No fungi or bacteria could be found. 'Baldwin' was the variety particularly affected. The precise cause of the decay, which was prevented from spreading by cold storage, could not be ascertained, but it was apparently due to some peculiarity in the season.—*F. J. C.*

Aquilegia glandulosa. By W. Wiseman (*Gard.* p. 27; 11/7/03).—A most interesting account of *Aquilegia glandulosa* in a Scottish nursery, where this plant is a great speciality. It thrives best in rich soil not liable to get dry in summer; but plants that have flowered for some years dwindle away. Three-year-old plants bloom the most profusely.

Plants can be moved from August to April. Seed ripens early in July, and if sown at once most of it will germinate the same summer, the remainder the following year.—*E. T. C.*

Arabis Billardieri. By W. Irving (*Gard.* p. 422; 20/6/03).—Among new plants that have recently flowered at Kew in the Alpine House is this Syrian *Arabis*. It is found growing on stony and shady hills near Damascus. It is quite hardy, although it much appreciates the shelter of a cold house in spring. As a pot plant it grows remarkably well, but if given a half-shaded position outside and planted in a stony soil it will probably thrive well. The flowers are large and vary in colour from purplish-rose to white.—*E. T. C.*

Aralia cordata Thunb. **as Salad.** By D. G. Fairchild (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 42, p. 17, June 1903; 2 plates).—Two varieties of this plant are grown in Japan, and the blanched shoots used for salad in winter; the methods of cultivation and dressing for use are described, and recommended for trial in America.—*E. A. B.*

Araujia sericifera (*Physianthus albens*) **as Moth and Butterfly Trap** (*Rev. Hort.* November 1, 1903, p. 491).—This plant, according to M. Louis Pondaven, attracts and entraps a large number of moths, especially nocturnal ones, in July and August, when it flowers, the plant being sometimes covered with them, owing to a presumed contraction of their stamens when the tongues of the insects are inserted to obtain the honey.—*C. T. D.*

Areca (?) Micholitzii. By W. B. Hemsley (*Bot. Mag.* tab. 7917).—Nat. ord. *Palmæ*, tribe *Arecæ*. Native of New Guinea. This is a small Palm, 5–6 ft. high. The leaves are pinnatisect. Flowers sessile, subdistichous. Flowered at Kew, but has not yet fruited.—*G. H.*

Arisæma japonicum (male). By W. B. Hemsley (*Bot. Mag.* tab. 7910).—Nat. ord. *Aroideæ*, tribe *Arineæ*. Native of China and Japan. This species is dicœcious with a globose tuber. The spathe equals in height the pedate leaves, green with longitudinal white stripes on the cylindrical tube.—*G. H.*

Asclepiadaceæ, Johannesburg. By Spencer Moore (*Journ. Bot.* 489, pp. 309–313; 9/1903).—Descriptions of *Xysmalobium Brownianum*, *Schizoglossum Randii*, *S. loreum*, *S. propinquum*, *Asclepias Calceolus*, and *Dichœlia microphylla*, collected by Dr. Rand at Johannesburg and new to science.—*G. S. B.*

Asclepias Kaessneri. By N. E. Brown (*Journ. Bot.* 491, p. 362; 11/1903).—Description of a new species collected by Mr. Kaessner at Kiu, in British East Africa.—*G. S. B.*

Asparagus Rust. By B. D. Halstead (*U.S.A. Exp. Stn. New Jersey, Rep.* 1902; pp. 403–408).—From reports received this disease (due to *Puccinia asparagi*) appears to be known in most of the States,

and to be very destructive in many. In one case burning the tops at the end of the season and then going over the beds with a disc cultivator is recommended ; another report states that a *thorough* application of Bordeaux mixture, so that the shoots "had the appearance of a blue Spruce," was accompanied by an enormous gain.—*F. J. C.*

Asparagus scandens. Anon. (*Gard. Chron.* No. 857, p. 339, fig. 130 ; May 30, 1903).—This is one of the prettiest of the evergreen Asparagi, and one of the hardiest. Though but little known, it is not a new species. It was introduced by Messrs. Elliot, of the Courtbushes Nursery, Hurstpierpoint. The foliage is hard and glossy, of a bright green colour, and very durable when cut. The blossoms are small and white, and are followed by bright red berries.—*G. S. S.*

Bacteria and the Nitrogen Problem. By George T. Moore (*Yearbook U.S. Dep. Agr.* 1902, p. 233).—After speaking of the paramount importance of nitrogen in agriculture, it is explained how nitrogen is lost, and how it is gained. The United States Agricultural Department have discovered a method by which the nitrogen-producing germs may be endlessly multiplied, and distributed in a dry form to any part of the world, and then again multiplied. This promises to be a most important new departure in agriculture. Many diagrams are given, and the manner of application of the bacteria-producing organisms is explained.

C. W. D.

Bamboos, Japanese, and their introduction into America. By David G. Fairchild (*U.S.A. Dep. Agr. Bur. Pl. Ind., Bull.* 43).—As an ornamental plant the Bamboo is well known in this country, but few, possibly, are aware of the fact that in its native home it is one of the most important plants in the economy of Japanese life.

This pamphlet contains a vast amount of interesting information regarding the propagation and commercial aspect of the Bamboo, with excellent illustrations of a Bamboo forest both well and badly kept, Bamboo groves in Japan, and methods of transplanting. The chapter dealing with the culture of the edible Bamboo (*Phyllostachys mitis*) and its value as a food plant is pleasant reading ; while the recipes added for cooking the tender shoots show to what a number of uses this plant may be applied. Under the heading of "Different species of Bamboos" there is a list of about twenty kinds, the clear descriptions of which should do away with any trouble in the matter of identifying the living plants.

A. D. W.

Banana Industry in Jamaica. By W. Fawcett, B. Sc., F.L.S. (*Bull. Dep. Agr. Jam.* vol. ix. pt. 9, p. 129).—After describing the botanical characters the author deals with varieties, analyses of soil,* a native soil showing extraordinary proportions of nitrogen and phosphoric acid, so that no manures will be necessary for full crops of standard fruit for many years to come. The cultivation and cost &c. are also considered.

G. H.

* Further analyses are given in (New series) *Bull. Dep. Agr. Jam.* Vol. i., pt. 1, p. 1).

Bark-beetles of the Lower Elbe. By Max Hagedorn (*Nat. Zeit. Land-Forst.* i. pp. 170–176; 1903).—A list, with notes on host-plants and localities, of species of *Scolytus*, *Hylesinus*, &c., found in the basin of the Lower Elbe.—*W. G. S.*

Batatas (*Convolvulus Batatas* or *Ipomœa Batatas*).—By L. Graebener (*Die Gart.* p. 121, December 12, 1903).—In the south of Russia this useful vegetable is much cultivated, although elsewhere it is almost unknown. The cultivation is identical with that of the Potato as well as the methods of cooking.—*G. R.*

Bean Mildew. By B. D. Halstead (*U.S.A. Exp. Stn. New Jersey, Rep.* 1902, pp. 399–403; 3 figs.)—The fungus (*Phytophthora phaseoli* Thaxt.), causing mildew on Lima Beans, proved one of the most destructive in the State during 1902. The young fruits and flowers were completely destroyed when attacked. The avoidance of wet, low-lying land, less close planting, and a more erect position for the plants are recommended, while it is stated that thorough spraying with Bordeaux mixture will insure a crop.
F. J. C.

Beans, French Varieties of. By Georges Bellair (*Rev. Hort.* July 16, 1903, pp. 330–2; 6 woodcuts).—Description of several good varieties, with suggestions as to culture and collection of crops.—*C. T. D.*

Begonias. Anon. (*Gard. Chron.* No. 883, p. 372, figs. 149, 150; Nov. 28, 1903).—"Perhaps no changes in plant form are more remarkable than those that have been effected by gardeners in the case of Begonias." It is a very large and widely-dispersed genus, and contains many species which differ very considerably from one another. The flowers of the commonly cultivated tuberous species have been so altered by the florists that if seen alone (without foliage &c.) they look as much like Camellias, Balsams, or Carnations, as Begonias. A short account of the prominent species in this genus is given, and of various hybrids. A figure is given of *B. laciniata* and of two handsome hybrids which have been derived from it.—*G. S. S.*

Begonias, On the Culture by Forcing of Tuberous. By A. Ragionieri (*Bull. Soc. R. Tosc. Ort.* 11, p. 326; November 1903).—The tubers were placed, during the first ten days of January, side by side in well-drained pans and covered with leaf-mould mixed with plenty of sand. They were kept moist by daily waterings of tepid water, and the surrounding temperature was kept at 14°–18° C. The atmosphere of the stove was always very moist, owing to the abundant evaporation from the frameful of Lilies of the Valley. As soon as the tubers began to sprout they were placed in pots of 8–12 centimetres diameter. All the forced tubers were 1–2 years old. The soil was composed of $\frac{1}{3}$ leaf-mould, $\frac{1}{3}$ chestnut-mould [?], $\frac{1}{3}$ old, rotten dung, sand, and strong loam. The potted plants were kept at the same temperature and the leaves wetted in order to keep off *Thrips*. Twice a week the stove was fumigated with tobacco-smoke for the same purpose. When the heat and light became too great the plants were shaded. In the last ten days of February the plants, having developed leaves and roots in plenty, were transferred to pots of 12–15

centimetres diameter, the soil being slightly richer and coarser. Soon the first flower-buds appeared, and the plants were then placed at a distance of 30–35 centimetres from the pipes. From now onward they received water containing dissolved sheep's dung, which is the best of all manures for this kind of culture. Under such treatment they developed very well indeed, and by the end of March were in flower. The first to flower was 'Die Schmetterling,' followed closely by a *cristata*. The *crispa* varieties and 'Mammoth' were the latest, appearing early in May. In between came *picta marmorata*, a white-centred form, double ones, and yellow-centred. The flowers of forced Begonias are usually larger, and of a fresher and livelier colour, than those flowering at the normal period.

W. C. W.

Belgian Horticulture: M. L. Linden et Cie.'s Nursery. Anon. (*Gard. Chron.* No. 854, p. 289; May 9, 1903).—An interesting account is given of a visit to this celebrated nursery garden, and also particulars of the methods of cultivating Orchids, which are so well grown in this establishment.—*G. S. S.*

Biological and Agricultural Institute in Amani, East Usambara. By A. Engler (*Not. König. Bot. Berlin, Bd. IV.*, pp. 63–66; July 10, 1903).—An account of the founding of what should be a very important biological station in East Africa. It stands on land between 650 and 1,100 metres above sea-level, amid a rich tropical and practically untouched flora, and would appear from Engler's description to be a promising paradise for young botanists.—*H. M. W.*

Bitter-rot of Apples. By H. von Schrenk and P. Spaulding (*U.S.A. Dept. Agr. Bur. Pl. Ind., Bull.* 44, 7/1903; 9 plates and figs.).—This disease is one of the worst attacking Apples in the United States, causing an estimated loss of $10,000,000 in 1900. The authors experimentally proved that the fungus causing the disease (usually known as *Glœosporium fructigenum*) has a permanent ascospore state which attacks the bark of the branches, causing canker-spots (see JOURN. R.H.S. xxvii. pp. 227, 281, 287, 731). The cankers appear as depressions on Apple branches up to 4 in. in diameter, forming sooty-black spots from one to several inches long, having more or less rugged edges. The surrounding bark is killed and cracked and fissured in various directions, while the wood below is dead and brown. It is thought that the fungus may start its attacks either in a wound or a dead branch. The canker-spot serves as a centre from which the disease spreads to the fruits. The remedies suggested are: (1) removal of diseased fruits and mummies; (2) removal of limb cankers; (3) spraying with fungicides.

Clinton (*U.S.A. Exp. Stn. Urbana, Bull.* 67) placed the ascospore stage in the genus *Gnomoniopsis* Stoneman, overlooking the fact that this generic name was already in use for a genus established by Berlese. The authors suggest the name *Glomerella* for the name of the genus, and revert to Berkeley's first published specific name, so the fungus should now be called *Glomerella rufomaculans* von Schrenk and Spaulding. Clinton's description (*loc. cit. ante*) is retained, with the

additional note: "The fungus forms cankers on Apple limbs, bearing both conidia and perithecia."—*F. J. C.*

Black Rot of Cabbage, Combating the. By F. C. Stewart and H. A. Harding (*U.S.A. Exp. Stn. New York, Bull.* 232, 4/1903; 2 plates).—This disease, characterised especially by the appearance of black streaks in the woody portion of the stem and in the leaf-stalks, is of bacterial origin, and is caused by *Pseudomonas campestris* (Pam.) Smith. The disease sometimes causes very considerable loss of Cabbages and Cauliflowers. It has been suggested that the removal of infected leaves would be an effectual remedy, but the authors find that not only is it unsuccessful, but that this method results in a largely augmented loss, in the case in question 49 per cent. of the crop compared with the untreated plot.

Further experiments along other lines are in progress.—*F. J. C.*

Boraginaceæ, Anatomy of the Order. By H. Jodin (*Ann. Sc. Nat.* [*Bot.*] xvii. pp. 263–346, 28 figs. and 5 plates; 1903).—A comparative research on the external and anatomical features of the Borage order, which is of importance to those interested. A chapter is devoted to comparison of the root; others to stem-organs, leaf, and germination respectively. The five plates and numerous figures in the text, along with the final summary (5 pages), will greatly facilitate reference to the numerous details included in the paper.—*W. G. S.*

Borders, Mixed. By Alger Petts (*Gard. Mag.* No. 2599, p. 561; 22/8/03).—The preparation and planting of mixed hardy flower-borders is discussed at length. This and similar articles on hardy flower gardening would be more valuable if the writers would state the parts of the country from which they write or to which locality their particular advice applies.—*W. G.*

Brasso-Cattleya striata. (*Rev. Hort.* June 16, 1903, p. 276).—Speaks highly of this new hybrid, *Brassavola fragrans* × *Cattleya Mossiæ*, and fairly intermediate in type. Very robust, floriferous, and sweetly scented.—*C. T. D.*

Broomrape on Coleus. By B. D. Halstead (*U.S.A. Exp. Stn. New Jersey, Rep.* 1902, pp. 408, 409; plate).—Notes the occurrence of *Orobanche ramosa* Linn. on *Coleus*.—*F. J. C.*

Bryophytes, Researches on. By F. Vaupel (*Flora*, vol. xcii., 1903, pp. 366–370; 8 cuts).—Leitgeb showed that in most mosses the whole of the growing point of the male shoot is used up (including the apical cell) in the formation of antheridia. *Polytrichum*, with its percaulate ("durchwachsen") male inflorescence, and *Mnium* appeared exceptional. This relation is explained by the fact that the male inflorescence is really compound, and that the partial inflorescences are on the Leitgeb type. *Mnium*, too, has a compound inflorescence; but here the principal shoot also undergoes the same fate as the lateral ones, and its apex is converted into an antherid. In *Catharinea Hausknechtii* the

archegonia show the same arrangement as the antherids. Serial sections by methods of which a detailed account is given formed the basis of these conclusions. A dark brown substance in the paraphyses and antheridial wall, unaffected by acids, appears to prevent the passing away to the stem of water that falls on and is required by the antherids. The evacuation of the antherid of *Marchantia* is due to the swelling of a mucous substance present in the cells of its wall. The rhizoid bundles of *Polytrichum* have the structure not of a cord, but of an electric cable, small outer rhizoids being twisted round a central larger one. Their function is primarily that of water supply. The adventitious buds of *Catharinea undulata* are borne on true rhizoids, not rhizomes.—*M. H.*

Buddleia variabilis (*Gard.* p. 152; 29/8/03).—This plant may be included among the most prominent shrubs introduced from China in recent years, and in favoured parts of the British Isles it will probably rank next to the yellow-flowered *B. globosa* in merit. It is of semi-herbaceous character and grows late into the autumn; in spring it shoots freely from the old wood, and during summer makes growths 4 to 5 feet long. It is a vigorous grower and flowers abundantly.—*E. T. C.*

Bulb Propagation. By S. Mottet (*Rev. Hort.* June 16, 1903, p. 282–4; 3 woodcuts).—A very interesting article on the propagation of Hyacinth and other bulbs by mutilation, which enables the axial buds, common to their massed foliage as to plants generally, to reach the light and develop. The bulbils produced, however, by entire excision of the base of the bulb would appear to be independently generated, as the axillary parts proper are excised entirely; the phenomenon is therefore similar to leaf propagation of *Gloxinia, Begonia,* &c.—*C. T. D.*

Bush Fruits (*U.S.A. Exp. Stn. Rhode Island, Bull.* 91, March 1903, tabs. and plates).—This is a valuable bulletin and of great use to all interested in the culture of bush fruits, *e.g.* Raspberries. Tables and diagrams are given, showing the results of various experiments extending over some years and contrasting the effects of various fertilisers, such as nitrate of soda, dried blood, &c. The plants grown on the plots which had been fertilised do *not* seem to have proved *always* superior to the others, and it is suggested that perhaps nitrate of soda, &c., force too rank a growth and induce winter killing. The effect of lime has also been extensively tested, and while it proved of advantage to the Blackberry, it would seem to have been not only of no advantage, but even injurious to the red Raspberry; but it should be noted that the experimenters appear to be far from satisfied that the results are absolutely reliable.

Interpollination and cover-crops are also dealt with. Interpollination had not been considered important before the experiments recently made, but, imperfect as the observations were, they indicate strongly that even prolific pollen-bearers may be benefited by association with other varieties blooming at the same time. Judging from the results given, the practice of sowing a leguminous cover-crop among bush fruits is likely to prove a desirable one. Useful notes are also given as to fruiting habits of these trees, plant selection, crossing of varieties, &c.—*V. J. M.*

Caladenia gemmata. By R. A. R. (*Orch. Rev.* Aug. 1903, p. 240).—Interesting particulars are here given of this blue, terrestrial, Australian species.—*H. J. C.*

Calanthes, The. By F. W. Thurgood (*Gard.* p. 321; 7/11/03).—These are among the most beautiful Orchids, and are divided into two sections, evergreen and deciduous, the latter being the more useful for decorative purposes, and in consequence more largely grown. This article gives a list of the deciduous species and hybrids, with full description. The methods of culture are also detailed at length.—*E. T. C.*

Calothamnus rupestris. By Sir J. D. Hooker (*Bot. Mag.* tab. 7906).—Nat. ord. *Myrtaceæ*, tribe *Leptospermeæ*. Native of Western Australia. The genus consists of 22 species, all restricted to S.-W. Australia. It is a robust evergreen shrub, 7–8 feet high. Leaves ½ inch long, rigid, acute and pine-like. Flowers crimson, 1½ inch long, petals scale-like, but the stamens, forming the most conspicuous part of the flower, are connate in four flattened clusters, with many yellow anthers.

G. H.

Campanula pulla (*Gard.* p. 440; 27/6/03).—Among the neatest as well as the most free-flowering of the dwarf Harebells is *Campanula pulla*. In some districts difficulty is experienced with its cultivation, but it usually grows and flowers freely *if left alone*. It appreciates a rich, light soil, and a fairly moist position, and if not kept to the rock-garden its whereabouts should be well marked, as scarcely any evidence of the plant is left during the winter. It must not be subjected to annual division and transplanting.—*E. T. C.*

Campanula Vidalii. By S. W. Fitzherbert (*Gard.* p. 297; 2/5/03).—This *Campanula* is entirely distinct from the rest of the genus, and although a handsome plant, is rarely met with. It was discovered by Captain Vidal, R.N., in a small island near Flores in the Azores in 1851, so that it has been in cultivation for more than fifty years. It is of shrubby habit, forming a woody stem 9 inches to 1 foot high, which at that distance from the ground throws out numerous branches, some of which become elongated into flower-spikes. It cannot be left with impunity in the open during winter, and should therefore be given glass shelter.—*E. T. C.*

Campylocentrum, The Genus (*Orch. Rev.* Aug. 1903, p. 245).—Description and interesting particulars of some eighteen species of this genus are given. As many of the species have been previously included under other generic headings, the classification here given will be most serviceable.—*H. J. C.*

Cane Syrup, The Manufacture of. By H. H. Harrington (*U.S.A. Exp. Stn. Texas, Bull.* 68, July 1903; illustrated).—The object of this bulletin is to encourage the small farmer to manufacture Cane syrup, either for his own use or to supply a local market.

A fair grade of syrup can be made with a very simple and primitive outfit, consisting of a three-roller horse mill for grinding the cane, and

one single-horse evaporating pan, but a higher grade is produced by the use of a hydrometer for testing the specific gravity; the use of some material, preferably grey moss, for filtering the juice; and, last but not least, upright settling tanks for the finished syrup.

For making more than a few hundred gallons, lime and a sulphur-box become necessary, and the use of steam heat, which can be controlled, is advisable.

When properly made, the syrup keeps for a year or more if exposed as little as possible to the air and not shaken. Pure Cane and Maple syrups, or even "open-kettle syrups," are seldom found on the market, most of that sold being in reality a mixture of glucose syrup with the lowest grade of refuse cane molasses.

The author pleads for an effective pure food law in the U.S.A. for the protection of the public, and the use of plain and distinct labels denoting the true contents of each article.—*C. H. C.*

Canthium transvaalense. By Spencer Moore (*Journ. Bot.* 492, p. 398; 12 1903).—Description of a new species of this Rubiaceous genus, collected by Dr. Rand at Johannesburg.—*G. S. B.*

Caoutchouc Region of the Amazon River, Ule's Expedition to the. By E. Ule (*Not. König. Bot. Berlin, Bd. IV.*, pp. 92–98; August 30, 1903).—Fourth report on the progress of the expedition, November 1901 to March 1902, dated from Madeira, dealing chiefly with *Hevea*.—*H. M. W.*

Cardamine, Monograph of the Genus (*concluded*). By O. E. Schulz (*Engl. Bot. Jahrb.* xxxii. 1903, pp. 417–623; 7/7/1903).—Comprises the remainder of the systematic portion of this monograph, to which reference was made in the last number of the JOURNAL (see Vol. xxviii. p. 239).—*A. B. R.*

Caricaceæ, Ovule of. By Ph. van Tieghem (*Ann. Sc. Nat.* [*Bot.*] xvii. pp. 373–381; 1903).—A short discussion on the structure of the ovule, and its effect on the classification of the orders in the author's recent system of classification. (See JOURN. R.H.S. April 1902, p. 889.)

W. G. S.

Carludovica jamaicensis, Lodd. By W. Fawcett and W. Harris (*Bull. Dep. Agr. Jam.* vol. ix. pt. 10, p. 145, 1902; with 3 plates).—The authors describe the plants and method of preparing the "straw" called Ippa-appa, for hats, &c.—*G. H.*

Carnation Disease: Stigmonose. By Albert F. Woods (*U.S.A. Dep. Agr., Div. Veg. Phys. & Path., Bull.* 19, 1900; 3 plates, 5 figs.).—This disease appears to be widespread, under certain conditions unfavourable to the plant. So far as can be determined by careful microscopical study, neither fungi nor bacteria are present in the earlier stages of the disease, but as the disease progresses various fungi and bacteria may appear. Infection experiments with bacteria and fungi, especially *Bacterium dianthi*, resulted negatively in every case. A disease having all the characteristics of the so-called "bacteriosis," except the presence of

bacteria (see JOURN. R.H.S. xxvii., Sept. 1902, p. 35, Pl. II., fig. 40), is produced by the puncture of aphides. That aphides and not bacteria are responsible for the trouble is shown by the fact that the injuries are not accompanied in the earlier stages by fungi or bacteria. The aphides, therefore, are not simply bacteria-bearers. Similar injuries also result from the attack of thrips. Another form of the disease may be caused by red spiders. Hence the name of "bacteriosis" is inappropriate, and that of "stigmonose" should be substituted. It is believed that the insect injects some irritating substance into the wound, which sets up changes which finally result in death to the plant. This disease may be successfully combated by proper selection of cuttings, careful propagation, good soil, proper amount of moisture, light, and air; and destruction of aphides, thrips, and red spider.—*M. C. C.*

Carnation, The Malmaison. By James Douglas, V.M.H. (*Gard.* p. 389; 5/12/03).—An exhaustive article dealing with the propagation, varieties, culture, and other points concerning this Carnation. The best flowering season for Malmaison Carnations is during May, June, and part of July, before the Picotees and Border Carnations. No manure should be used, as it causes a coarse, sappy growth, and predisposes the plants to rust and other diseases.—*E. T. C.*

Casuarina stricta. By T. C. Frye (*Bot. Gaz.* vol. xxxvi. No 2, p. 101, pl. xvii).—The author first gives a résumé of Treub's investigations, and then describes his own on *C. stricta*, and draws a comparison with Treub's observations on *C. Rumphiana, glauca*, and *suberosa*; first as to points of agreement, and then, those in which the author differs, viz. as to the origin of the sporogenous tissue, arising from the hypodermal archesporial plate, &c. Additional facts are the "double fertilisation," there being two sperms, crescentic in the embryo-sac, and spherical in the pollen-tube.—*G. H.*

Caterpillar Webs. By L. Vigneau (*Le Jard.* July 20, 1903, p. 221).—An excellent method to effect their destruction fully described.

C. W. D.

Cattleya Lucieniana. By R. A. Rolfe (*Orch. Rev.* Sept. 1903, p. 282).—The identity and interesting comparisons are made with this supposed natural hybrid between *C. Loddigesii* and *C. Schilleriana.*

H. J. C.

Cattleya scita. By R. A. Rolfe (*Orch. Rev.* Aug. 1903, p. 254).—Particulars are here given of this supposed natural hybrid, and information is sought as to what has become of the original plant.—*H. J. C.*

Ceanothus 'Ciel de Provence.' By Ed. André (*Rev. Hort.* July 16, 1903, pp. 332–3; coloured plate).—Interesting note *re* three geographical sections of this genus, North American, Mexican, and Californian, and their relative hardiness or tenderness. The variety figured appears very attractive, inflorescence resembling Lilac in form and colour; flowers freely and successively.—*C. T. D.*

Centaurea dealbata (*Journ. Hort.* June 11, 1903, p. 514).—A useful dwarf, hardy herbaceous plant, with pink flowers and ornamental leaves, silvery beneath, recommended for mixed borders—with a life-sized engraving.—*C. W. D.*

Cereus Greggii. By W. W. (*Gard. Chron.* No. 867, p. 93, fig. 43; Aug. 8, 1903).—This extraordinary Cactus is remarkable for its large carrot-like root, which attains the length of 18 inches, and a diameter of 8 inches, with a weight of $12\frac{3}{4}$ lbs. The writer says: 'A Cactus with a large tuberous root is an anomaly, reserve food material being almost invariably, in the plants of this order, stored in the succulent stems, the root system being comparatively small." This species has been lately imported from Arizona, and appears to be rare, but may be found in Texas, New Mexico, and Arizona. Two specimens are now at Kew.

G. S. S.

Ceylon Patanas, Botany of. Part 2. By J. Parkin and H. H. W. Pearson (*Journ. Linn. Soc., Bot.* vol. xxxv. p. 430, pls. 11 & 12).—The authors, in the introduction, say: "In a former paper (vol. xxxiv. p. 300) some account was given of the grass-lands, locally known as 'patanas,' which cover a large part of the surface of the montane region of Ceylon." The patanas are of two kinds, wet and dry; the former are as a rule 4,500 feet above the sea, and the dry below that altitude. "Judging from the characters of the soil and climate of the two regions, the plants of the 'dry' patanas might be expected to show a greater xerophytic tendency and a more marked protection against insolation than those of the 'wet' patanas. With a view to verifying these deductions the subaerial parts of eighty species, all Dicotyledons except two, have now been submitted to anatomical examination." The results of this examination are given in a table showing the thickness of the various layers of cells, the number of stomata, &c. This is followed by a general summary of the anatomical characters of the leaf, a comparison of these characters in the plants from the 'wet' and 'dry' patanas, remarks on the structure of erect and semi-erect leaves, special points in the anatomy of the leaf bearing on xerophytism, additional points of anatomical and physiological interest, and a general summary. In their concluding remarks the authors say: "In a former paper it was stated that 'the flora of the patanas as a whole is composed of plants which, generally speaking, present characters which tend to reduce transpiration and to protect delicate parts from the injurious effects of intense illumination.' This view, the result of field observations, is sufficiently borne out by the anatomical characters, herein recorded, of those plants which have been available for examination."

G. S. S.

Charlock (*Brassica* sp.), **Destruction of** (*Qu. Agr. Journ.* xii. p. 316, May, 1903).—One of the most troublesome weeds the wheat farmer in Queensland has to contend with is a member of the Cabbage family. Experiments have been made and recorded of various sprays which have been employed for the destruction of Charlock. A machinist has now invented a spraying machine which covers a width of 24 feet with its movable arms. The results obtained by spraying with the "Straw-

soniser" are said to be wonderful. It has been conclusively proved that the Charlock can be destroyed at any period of its growth by copper sulphate, but a less quantity is required when the plant is young. About 50 gallons of a 3 per cent. solution will destroy 95 per cent. of the weed in an average infested crop, and the increased yield of wheat is more than sufficient to pay all the expenses of spraying. An average farm labourer can be trusted to carry out the operation with half an hour's instruction.

M. C. C.

Chemical Composition of Plants, Influence of Environment on. By Dr. H. W. Wiley (*U.S.A. Dep. Agr. Year Bk.* 1901, p. 299 ; tabs.). The term "environment" as used here includes the soil, fertilisers, character of the cultivation, and climatic influences. Cereals, Sugar Beets, &c. are treated of. Tables are given showing the results of analyses of original imported seed and of first crop of wheat grown. One of the principal seasonal influences affecting the composition of the wheat-grain, and probably also of other cereals, is the length of period of growth. There appears to be a marked relation between the content of protein matter and starch and the length of the growing season. The shorter the period of growth and the cooler the climate, the larger the content of starch, and *vice versa*. As a result of experiment it seems that the growth is hastened where a high content of protein is desired. By certain modifications of methods of cultivation, time of planting, irrigation and fertilisation, great advantage might be taken of natural climatic conditions, which in the end would produce the same results as if the conditions themselves could be altered. It is stated that a high temperature during July diminishes the yield of grain, especially in lowering the production of starch. Valuable charts are given showing percentage of sugar in the Sugar Beet according to latitude and sunshine, temperature, length of day, rainfall, &c. In warmer climates the practice of irrigation bids fair to secure crops of Beets of high quality, and ought to be carefully attended to.—*V. J. M.*

Chenopodiaceæ (Australian) as Fodder Plants in Dry Regions. By L. Diels (*Not. König. Bot. Berlin, Bd. IV.*, pp. 70–78 ; August 30, 1903).—Of the 110 or so species of Chenopods, known in Australia as Salt Bush, *Atriplex*, *Rhagodia*, *Kochia*, and *Bassia* yield many useful fodder plants, and the author gives the characteristic features of a series of them, and an account of their habitats and food value, planting, and treatment.

The paper seems to me a useful one for colonists, and should prove a capital example of the kind of botany all settlers and planters ought to learn to appreciate.—*H. M. W.*

Cherry, "Cerise du Bicentenaire." By G. Duval (*Rev. Hort.* June 16, 1903, p. 284–5 ; coloured plate).—A sport from 'Royale' grafted on 'Sainte Lucie.' Fruits larger and three weeks to a month later in ripening, forming a very late Cherry, recommended as a good market fruit.—*C. T. D.*

China, Flora of. By F. B. Forbes and W. B. Hemsley (*Journ. Linn. Soc., Bot.* vol. xxxvi. p. 1, continued from vol. xxvi.).—"An enumeration

of all the plants known from China proper, Formosa, Hainan, Corea, the Luchu Archipelago, and the Island of Hongkong, together with their distribution and synonymy."—*G. S. S.*

Chinese Plants, Descriptions of New. Chiefly by S. T. Dunn (*Journ. Linn. Soc., Bot.* vol. xxxv. p. 483).—In this paper are described a number of new plants which were collected by Dr. A. Henry in Yunnan, together with some from other sources. An introductory note is contributed by C. H. Wright.—*G. S. S.*

Chloræa longibracteata. By W. B. Hemsley (*Bot. Mag.* tab. 7909).—Nat. ord. *Orchideæ*, tribe *Neottieæ*. Native of Chili. This genus differs from its allies it having no spur. This is a terrestrial herb, 12–18 inches high, with radical sub-rosulate leaves. Flowers 1–1½ inch diameter, loosely spicate. Sepals white, the two lateral with horn-like tips, terminal oval-oblong like the petals. The labellum is orange-coloured and crested.—*G. H.*

Chlorides, Conditions Determining the Poisonous Character of. By H. J. Wheeler and R. L. Hartwell (*U.S.A. Exp. Stn. Rhode I., Rep.* 1902, pp. 287–304).—A record of a series of experiments to determine under what conditions chlorides of calcium, &c., are poisonous to plants. The conclusions arrived at are: 1. That chlorides of calcium and ammonium exert a marked poisonous effect on certain plants when applied to an *acid* soil. Magnesium chloride was found not to be poisonous under the same conditions. 2. Calcium carbonate or caustic magnesia, or a mixture of basic slag with potassium and magnesium chloride, was found to counteract the ill effect of the calcium or ammonium chloride. 3. That, provided the soil is not acid, a mixture of sulphate of ammonia and muriate (chloride) of potash or kainit may be used for manuring.

Acidity is overcome by the addition of lime or wood-ashes to the soil.

F. J. C.

Chrysanthemum Diseases (Maladies et Parasites du Chrysanthème). (*Bull. Soc. Myc. Fr.* xix. 378).—The following is an enumeration of the diseases to which the Chrysanthemum is liable:—*Phyllosticta Leucanthemi* (Speg.), *Cylindrosporium Chrysanthemi* (E. & D.), *Septoria socia* (Pass.), *Septoria Leucanthemi* (Sacc. & Sp.), *Septoria Chrysanthemi* (Cav.), *Oidium Chrysanthemi* (Rabh.), *Puccinia Chrysanthemi* (Roze).—*M. C. C.*

Chrysanthemums, Manurial Experiments with (*Gartenflora*, 1/6/03, p. 297; 15/6/03, p. 315; 1/7/03, p. 347; 6 figs).—This article describes manurial experiments upon pot plants of the large-bloomed Chrysanthemum 'Viviand-Morel,' carried out by a committee in 1899 at four places. At two stations the plants were grown indoors, at the others out of doors. The soil in which the plants were grown was first mixed with one gram of potassium phosphate for every kilogram used, *i.e.* one part in every 1,000 of soil. Rain-water was used for watering the plant.

The plants received manures as below:

Series I. Unmanured (control plants).
„ II. Sulphate of ammonia 5 parts in 1,000 of water.
„ III. Sulphate of ammonia 20 parts in 1,000 of water.

Series IV. Liquid manure Gruben-Dunger (Jauche) or fæces 100 parts in 1,000 of water.

„ V. Same as IV. with 5 parts horn meal, and ½ part of sulphate of ammonia.

These manures were added each week, and rain-water was applied on the intervening days when necessary.

The experiment was carried on from March 20 to November 9, or 234 days, the manure being added at intervals from April 24 to October 21, on 26 occasions. The plants were repotted four times: on March 30 into 10 cm. pots, May 8 into 13 cm., June 3 into 18 cm., and July 28 into 22 cm. pots.

The total amount of water utilised by each plant averaged about ·76 litres per day. All were pinched back alike up to the June 10.

Measurement of the height of the plants, the number of shoots, average weight of five leaves from each, and the colour of the leaves are given in the paper. The leaves of the unmanured plants were yellowish-green, those of the manured specimens being darker green in the following orders, series IV., V., II., III., the last being the darkest.

The average widths and lengths of leaves were measured. The greatest width and length among the indoor plants was seen in series II., the smallest length in series I., the least width in series IV. Only one flower was allowed on each shoot, and the manuring was continued until the colour of the bloom was beginning to appear (on October 21), after which it was not repeated.

The colour of the flowers of the manured plants was a darker rose than that of the unmanured specimens; it was also duller in the case of the indoor plants than the outdoor ones.

The colour of the plants manured with the heavy dose of sulphate of ammonia (series III.) was distinct from the rest, being a more bluish-rose tint. Analyses were made to determine the dry matter and nitrogen contents of the roots, stems, leaves and flowers, the results of which are given in detail.

The application of sulphate of ammonia seems beneficial, and the Chrysanthemum is able to take up and make use of this substance even when applied in such strong doses as in series III.—*J. P.*

Cineraria longipes. By Spencer Moore (*Journ. Bot.* 492, pp. 400–401; 12/1903).—Description of a new species allied to *Senecio cordifolius* (*Cineraria mitellæfolia*), collected near Johannesburg by Dr. Rand.

G. S. B.

Cistanche violacea. By Sir J. D. Hooker (*Bot. Mag.* tab. 7911).—Nat. ord. *Orobanchaceæ*. Native of Morocco and Algeria. A fleshy, leafless herb, parasitic on chenopodiaceous plants, *Gypsophila alba*, *Statice monopetala*, &c., 6–15 inches high. Corolla violet-coloured, the flowers being densely massed.—*G. H.*

Clematis Meyeniana. By Sir J. D. Hooker (*Bot. Mag.* tab. 7897).—Nat. ord. *Ranunculaceæ*, tribe *Clematideæ*. Native of China. An evergreen climber, with trifoliate leaves; panicles large and effuse. Flowers 1 to 1½ inch across; sepals white.—*G. H.*

Clerodendron cephalanthum. By W. B. Hemsley (*Bot. Mag.* tab. 7922).—Nat. ord. *Verbenaceæ*. Native of Zanzibar Island. A handsome shrub, climbing by means of modified petioles, the lower part of which thickens, the upper part disarticulating, leaving it as a recurved hook. The flowers are densely cymose-capitate. Calyx red; corolla white, with a tube $3\frac{1}{2}$ inches long. Stamens crimson, long exserted.

G. H.

Clerodendron myrmecophilum. Anon. (*Gard. Chron.* No. 854, p. 291, fig. 118; May 9, 1903).—This new *Clerodendron* from Singapore has recently been flowered at Kew. A description of the plant was given in the 'Gardeners' Chronicle' on March 28 last. The flowers are of a bright orange colour. The plant is a highly ornamental one and a great acquisition.—*G. S. S.*

Club-root. By Geo. Massee (*Gard. Chron.* No. 882, p. 351; Nov. 21, 1903).—The author wishes to make clear his views on this subject, which have not hitherto been grasped, and says: "The principal point to remember is that Cruciferous plants can only be attacked by the organism causing 'club-root' during the seedling stage. When a plant is six weeks old it may for all practical purposes be considered immune against the attacks of club-root, even if planted in soil containing the germs of the disease. If Cabbage plants are grown in seed-beds absolutely free from disease, they will remain healthy as far as club-root is concerned." —*G. S. S.*

Cœnomyces consuens: a new Fungus. By C. v. Deckenbach (*Flora*, vol. xcii., 1903, pp. 253–281, t. vi.–vii.).—This mould is a parasite in the gelatinous sheath of *Calothrix parasitica*, a blue-green Alga, itself parasitic on Red Seaweeds (*Nemalion*). It has a varicose, septate mycelium whose extramatrical branches bear pyriform zoosporangia (15–23 μ wide), coloured orange with minute oil-drops and containing numerous nuclei, and ultimately discharging through a very long (120–150 μ!) tubular process or 'neck' the 1-flagellate zoospores, which swim with the flagellum posterior, like a Metazoon sperm. This plant is most closely allied to the (doubtful) Chytridian *Aphanistis* Sorokine, which has similar mycelium and zoospores. An interesting discussion on the interrelations of the Fungi follows. The author subdivides them into three equivalent groups: (1) Phyomycetes; (2) Cœnomycetes (these two genera); (3) Eumycetes (Ascomycetes, Basidiomycetes).—*M. H.*

Colletia cruciata (*Gard.* p. 371; 30/5/03).—This interesting Chilian shrub is not generally met with, but is hardier than its habitat would suggest, being rarely if ever injured by frost in the South-west of England. It is sometimes stated that the flowers do not add much to its effect, and as a rule it may be allowed that the small white urn-shaped flowers, which are wax-like in texture and very lasting, do not render the shrub a conspicuous object, since they are rarely borne in quantity; but in instances like the specimen illustrated the case is different, the effect being distinctly beautiful and striking.—*E. T. C.*

Colour of Flowers. By F. W. Card and L. P. Sprague (*U.S.A. Exp. Stn. Rhode I., Rep.* 1902, pp. 231, 232).—McDougal has stated that the red colour of plants may be intensified by feeding with sugar. Experiments were carried out with Stocks, Asters, Phlox, and Balsam to see whether the red of the flowers was changed in any way by the addition of this or other substances to the soil. The seed of each variety was divided into four sections. Section 1 had no manure, 2 received sugar, 3 muriate of potash, 4 nitrate of soda.

The manures were applied about the time of flowering. None of the fertilisers had any effect whatever upon the colour.—*F. J. C.*

Conifers, Chinese. By M. T. Masters (*Gard. Chron.* No. 850, p. 227, figs. 93, 94, 95, 96; April 11, 1903).—Dr. Masters gives an account of the genus *Cephalotaxus*, which contains five species, three of which are figured. This genus is nearly allied to our Yews, and, like them, bears conspicuous berries, those of *C. drupacea* being nearly $1\frac{1}{2}$ inch in length and shaped like an olive. A table is given of the species, showing their differences, by the form, &c., of the leaves. All the Japanese and Chinese species have proved hardy at Kew. Their dense, bushy, and evergreen foliage renders them desirable inmates of the garden.—*G. S. S.*

Conifers, Chinese, collected by E. H. Wilson. By Maxwell T. Masters (*Journ. Bot.* 488, pp. 267–270; 8/1903).—An enumeration of the forms collected by Mr. Wilson in South-western and Central China for Messrs. James Veitch and Sons, with figures of *Picea neoveitchii*, *P. Wilsoni*, and *Keteleeria Evelyniana*, recently described in the 'Gardeners' Chronicle.'—*G. S. B.*

Coniferous Forests in U.S., Insect Enemies. By A. D. Hopkins (*Yearbook U.S. Dep. Agr.* 1902, p. 265).—The writer gives the result of investigations made by personal survey. Two beetles stand conspicuous on account of their terrible ravages, viz. the Spruce-destroying beetle (*Dendroctonus piceaperda*) and the Pine-bark beetle (*Dendroctonus frontalis*). Illustrations of these beetles in all their stages are given, and of the way in which they work, resulting in the destruction of whole forests. Recommendations are given by means of which these pests may be kept in check.—*C. W. D.*

Corn Breeding, Methods of. By Dr. Hopkins (*Bull. Dep. Agr. Jam.* vol. i., pts. 6, 7, p. 156).—The author calls attention to the structure of a grain of Indian Corn, in that the outer part is horny, the inner starchy, and the embryo oily. The relative proportions of these three parts vary in size; so that if protein be the object of selection those grains should be selected with the largest horny portion; if starch, those with whiter part in the greatest proportion. As all the grains on a cob are mostly alike, one grain will indicate the nature of all. He adds details upon the practical methods of selecting and growing the selected grains.

G. H.

Cornus capitata. By S. W. Fitzherbert (*Gard.* p. 135; 22/8/03).—From Nepaul in 1825 seeds of this handsome flowering tree were first

sent to Mr. John Tremayne, Heligan, Cornwall. It is usually considered tender, but at Fola in Co. Cork it has withstood 25° of frost with but little injury. In Cornwall it is largely planted in woods and shrubberies, and presents a lovely sight in July when covered with its large pale sulphur flowers, which are about three inches in diameter and give the trees the appearance of clouds of bright yellow, while the effect by moonlight is particularly charming.—*E. T. C.*

Costus Friedrichsenii, O. G. Petersen. By R. Schumann (*Gartenflora,* 1/12 03, p. 617; pl. 1521).—A coloured plate and brief description of a plant cultivated for some time in the Berlin Botanic Gardens under the name *Costus comosus,* Roscoe. The native habitat of this species is apparently not certainly known.—*J. P.*

Cotton, Cultivation of. By B. Edwards (*Bull. Dep. Agr. Jam.* vol. ix. pt. 12, p. 177).—A series of extracts from various works dealing with *The History of the Brit. Col.* 1793; from the *Flora,* and *Transactions of the Soc. of Arts,* of Jamaica; and from *Botany of Cotton,* &c. *G. H.*

Cotyledon macrantha. By Ed. André (*Rev. Hort.* October 1, 1903, pp. 452–3; coloured plate and woodcut).—Very handsome deep rose-coloured flowers, borne in ramose panicles. Highly recommended for dry temperate or Cactus house, in which it is of easy culture.—*C. T. D.*

Cotyledon (*Echeveria*) **pulvinata.** By Sir J. D. Hooker (*Bot. Mag.* tab. 7918).—Nat. ord. *Crassulaceæ.* Native of Mexico. This species differs from the majority of its congeners by the clothing of velvety, silvery, white hairs, which turn brown on the branches and are reflexed in age on the leaves. The flowers are yellow, with the midribs to the petals crimson externally.—*G. H.*

Cotyledon undulata. By W. B. Hemsley (*Bot. Mag.,* tab. 7931).—Nat. ord. *Crassulaceæ.* Native of S. Africa. An erect shrub, 2–3 feet high, mealy; flowers in paniculate cymes, 6 inches diam., 1½ inch long, yellow and orange-red, pendulous.—*G. H.*

Cereus peruvianus, Hardiness of (*Rev. Hort.* June 16, 1903, p. 274).—A specimen at Narbonne is described which is growing in the open, but in a sort of bay in the angle of two buildings, with southern aspect. It is about 33 feet high, 18 years old, and generally in the winter the temperature falls to 8° below zero (C.) = about 15° frost (F.), which it has withstood without any protection whatever.—*C. T. D.*

Cratægus sp. By C. S. Sargent (*Bot. Gaz.* vol. xxxv. No. 6, p. 377).—The author describes no less than *twenty* new species of this genus in the neighbourhood of Chicago.—*G. H.*

Crocus caspius. By E. A. Bowles (*Gard. Chron.* No. 887, p. 443, fig. 173; Dec. 26, 1903).—This fine species was discovered in 1838 on the western and southern shores of the Caspian Sea, but it was not then introduced into cultivation. Last autumn a collector was sent out to look for it;

it was found in abundance south-west of the Caspian Sea and south of Baku, growing under the shade of low bushes at an elevation of not more than 1,000 feet. The flowers vary in colour from white to a decided rosy-lilac, with a more or less yellow throat. It is a handsome, large-flowered species, the flowers opening well in sunshine; its great charm is due to the unusually lengthy period of its flowering. It has been recorded as blooming from September to April in its wild state.—*G. S. S.*

Croton 'Souvenir de Louis Fournier.' By Ed. André (*Rev. Hort.* August 16, 1903, p. 380; coloured plate).—A very brightly coloured and handsome trilobed variety. Young leaves green margined with orange, with venation of the same colour, but spreading into irregular blotches; ultimately the green becomes very intense, and the orange bright crimson.—*C. T. D.*

Crown Gall of Apple Trees. By W. B. Alwood (*U.S.A. Agr. Exp. Stn. Virginia, Bull.* 140, September, 1902; 12 figs.).—The following conclusions are to be derived from this communication:—That the organism which produces the abnormal growth known as "crown gall" on the Apple appears to gain entrance to the Apple seedlings in the nursery. That the unusual amount of fibrous roots at and below the crown is the characteristic to be depended upon for recognition of the trouble. Persons planting fruit trees should reject with the greatest care all trees which show the cancerous growth about the crown, or a sufficiently abnormal development of fibrous roots about the crown to warrant belief that the plants are diseased. One should not confound the knots caused by woolly aphis with this disease. Apparently "crown gall" can be easily inoculated from a diseased plant to healthy ones; hence diseased plants should not be allowed to remain among healthy ones in the orchard. The study of the subject is far from complete, and further investigation may show that there is more than one trouble occurring upon nursery stock which is now attributed to "crown gall." That the disease is due to a low parasitic organism which may exist in the soil and be propagated from plant to plant is probable, but whether belonging to the slime moulds (*Myxomycetes*) has not been settled, but is under investigation.—*M. C. C.*

Cryptophoranthus, The Genus (*Orch. Rev.* Oct. 1903, p. 302).—The various species of this remarkable genus, known as "Window-bearing Orchids," are enumerated, and interesting particulars of the structural formation of the flowers, which Darwin considered a mystery, in respect to its fertilisation.—*H. J. C.*

Cucumber Mildew (*U.S.A. Exp. Stn. Hatch, Mass., Ann. Rep.* 1903, p. 29).—This fungus (*Plasmopara cubensis*), which, as its name implies, came originally from Cuba, was first discovered in the United States in 1889 and has since spread throughout the southern and middle, *i.e.* the warmer parts of the country, causing great damage. It seems chiefly to affect greenhouse Cucumbers, and is of a downy appearance. A dry atmosphere is recommended, and the affected leaves should be at once removed and destroyed. Spraying with Bordeaux mixture on both sides of leaves has been found effectual in keeping down the nuisance.—*V. J. M.*

Cupressus, The Pollen-tube of. By H. O. Juel (*Flora*, vol. xciii., 1904, pp. 56–62, t. iii.).—The pollen-tube of *Cupressus* contains one generative and two vegetative nuclei; the former early gives rise by repeated divisions to as many as 20 sperm-nuclei, each of which may be functional. The large number, as contrasted with that of two of most gymnosperms and gametophytes, suggests a possible early divergence of the Cypresses from the Conifer stem. The author indicates a comparison with the multicellular pollen-grain of *Cordaiteæ*, but does not venture to press the comparison. As a fixative for dense masses he recommends the formula:

Zinc chloride	gm. 2
Glacial acetic acid	cc. 2
Alcohol, 45–50 per cent.	cc. 100

M. H.

Cydonias. By W. J. Bean (*Gard. Chron.* No. 887, p. 434, figs. 168, 169, and 170; Dec. 26, 1903).—In this article the various species belonging to the genus *Cydonia* are described and commented upon.—*G. S. S.*

Cypripedium Fairieanum. By O. Opoix (*Rev. Hort.* June 1, 1903, pp. 255–71).—Woodcut, list of 20 hybrids with same, and cultural directions.—*C. T. D.*

Cypripediums, Hardy. By G. B. Mallett (*Gard. Chron.* No. 855, p. 307; May 16, 1903; continued in Nos. 858 and 859; figs. 138 and 146).—The author in this paper gives a description and the best means of cultivating some ten different species, and figures are given of *C. japonicum* and *C. pubescens*. Most of the species are American, but some are European or Asiatic. The various difficulties likely to be met with in the cultivation of these plants are fully dealt with.—*G. S. S.*

Cypripediums, Hardy (*Gard.* p. 41; 18/7/03).—Few hardy plants are more admired than the Lady's Slippers. Their popularity is well deserved, and as it becomes realised that these Orchids are perfectly hardy in British gardens the demand will increase. *C. spectabile*, *C. pubescens*, *C. Calceolus*, *C. acaule*, and *C. macranthon* are the best, and these are described and their culture detailed.—*E. T. C.*

Cypripediums, Hardy, and their Cultivation. By L. Lemoine (*Le Jard.* August 5, 1903, p. 236).—It is useful to compare the treatment of these in France, as several of them are hard to keep in England.

C. W. D.

Dahlias (*Journ. Hort.* July 23, 1903, p. 81).—It is asserted that the Dahlia was first introduced to Europe for its edible qualities, the roasted root being good and wholesome as a Potato.—*C. W. D.*

Dahlias 'à Collerette.' By G. Legros (*Rev. Hort.* July 1, p. 305–7; 1 woodcut).—Two varieties described, 'Joseph Goujon' and 'Président Viger.' The figure represents a broad-petalled, somewhat reflexed, lily-like flower of single type, but with a number of slender elongated florets

in the centre, the latter forming the "collerette." Sent out by Vilmorin and regarded as the commencement of a distinct type.—*C. T. D.*

Date-leaf Boat. Anon. (*Gard. Chron.* No. 854, p. 300; May 9, 1903).—A description of certain boats which are used in the Persian Gulf is given by Dr. Fairchild in the 'Botanical Gazette.' They are made entirely of the midribs of the leaves of the Date Palm, strips of which are cut about 1½ inch in diameter and 10 feet long. They are fastened together with wooden pegs and strong twine. The coast is so barren that it is impossible to get wood, the only trees being a few Date Palms planted round the telegraph station at Jask.—*G. S. S.*

Davidia involucrata. By M. T. Masters (*Gard. Chron.* No. 850, p. 236, fig. 98; April 11, 1903).—This fine plant is a native of China; it was first discovered by the Abbé David in 1871, and has been for some little time under cultivation in France, but it has only lately been introduced into commerce. "We doubt not that so showy a species will speedily become common." In growth it much resembles a small Lime-tree. The two bracts below the flowers are large, and cream-coloured, flushed with pink. If it proves hardy and flowers freely in this country it will be a great acquisition to our gardens.—*G. S. S.*

Davidia involucrata, The Germination of the Seeds of. By W. B. Hemsley (*Journ. Linn. Soc., Bot.* vol. xxxv. p. 556, pl. 19).—"*Davidia* is one of the most remarkable of the endemic genera of the trees of China. It is a monotype, with foliage strongly resembling that of a Lime-tree, and an inflorescence resembling no other." The fruit is oval and about 1½ inch in length. When the outer part decays the carpels partly open, the seeds germinate, and "the radicles of as many seeds as are present in the fruit emerge simultaneously." There is also a rapid elongation of the cotyledons, by which the axis of the plantlet is carried outside of the testa, the radicles turn towards the soil, which they enter when the developing cotyledons absorb the reserve-materials of the endosperm, soon free themselves and assume a horizontal position, become green, and persist a long time.—*G. S. S.*

Dendrobium Harveyanum (*Orch. Rev.* Oct. 1903, p. 313, fig. 48).—A finely illustrated raceme of four flowers is given in the photographic reproduction. Particulars of its history are also included.
H. J. C.

Dendrobium Madonnæ. By Sir J. D. Hooker (*Bot. Mag.* tab. 7900).—Nat. ord. *Orchideæ*, tribe *Dendrobieæ*. Native of New Guinea. The flowers are 2½ inches broad, nodding, white, with a few purple spots near the margins of the lateral lobes of the lip.—*G. H.*

Denitrification, Contributions to the Morphology and Physiology of. By J. G. Lipman (*U.S.A. Exp. Stn. New Jersey, Rep.* 1902; pp. 183–241; one plate).—The changes brought about in dead organic matter by certain kinds of bacteria frequently lead to very considerable losses of nitrogen. The factors determining the extent of this loss are:

1, the character of the decaying substance; 2, the organism present; 3, the conditions under which decomposition takes place. The investigations recorded by the author were carried out with the idea of gaining exact knowledge of the processes of decay, particularly in regard to the loss of nitrogen.

The economic importance of such investigations will be seen when it is recognised that, as the author points out, only about 25 per cent. of the nitrogen content of fresh manure is recovered in the crop.

The character of the decomposition is largely determined by the supply of oxygen. When this is abundant, oxidising processes prevail, leading to the formation of nitrites and nitrates from the decaying matter, while when the supply is limited, reducing processes prevail, and only partial decomposition takes place. The results obtained by different experimenters show that there may be an actual loss of nitrogen in both processes, but the extent of this loss varies greatly according to the species of bacteria present. The results of the cultivation of certain germs in a nutrient solution (bouillon) free from nitrate showed that under similar conditions the loss varied from 1·3 per cent. caused by *Bacillus New Jersey* to 14·5 per cent. by *B. fluorescens liquefaciens* and 25·6 per cent. by *B. subtilis*, while when a mixture of soil bacteria was employed the loss amounted to 35·2 per cent.

When nitrates are present they may be reduced, *i.e.* denitrification may occur to the detriment of the available nitrogen in the soil. When *Bacillus coli* was growing in the solution 79·51 per cent. of the nitrates originally present were so changed, while *Proteus vulgaris* caused a similar change of 87·15 per cent. *Bacillus subtilis* caused no denitrification. Results of experiments are also recorded showing that the different nitrates are reduced to varying extents by the same bacillus under the same conditions.

It was also found that in solutions containing only a trace of nitrogen and some carbon compound—lactic acid was found very suitable—the denitrifying bacteria experimented with were mostly able, particularly when a large surface was exposed, *i.e.* when thorough aeration was effected, *to fix the free nitrogen* of the air.

These results emphasise the great need of further experimental work with soil bacteria in order to ascertain accurately their action and the factors determining their growth. The results of these experiments will throw further light upon the best means of cultivation of soils, and upon some of the complex problems involved in the profitable growth of crops.

Technical descriptions are given of the new *Bacillus New Jersey* and a variety, and of a few other bacteria used in these experiments.—*F. J. C.*

Didymoplexis pallens. By R. A. Rolfe (*Orch. Rev.* Aug. 1903, p. 227).—Interesting particulars of the distribution of this saprophytic Orchid in its native habitats. A description of the plant recently flowering at Kew is also given.—*H. J. C.*

Dipteryx, Double Secretory Apparatus in. By E. Heckel and H. J. de Cordemoy (*Comp. Rend.* January, 1904, p. 57).—In *Dipteryx*

(*Coumaronna*) *odorata*, Willd., and probably in all species of *Dipteryx*, there are present, at all events when mature, two distinct secretory bodies; (1) a resinous copal formed in special receptacles scattered over different parts of the plants; (2) a tanno-glucose (kino) produced in well differentiated special cells.

In *D. odorata* the sequence of development of this double series of secretory organs is as follows: The receptacles containing copal are formed first, the special cells producing tanno-glucose being differentiated at a later stage.

Depending on the relative number of the two kinds of secretory organs present, it is possible to recognise from what portion of the plant a given fragment has been obtained.

In the stem the copal receptacles are very few in number and confined to the primary and secondary cortex, whereas the cells containing kino, owing to their abundance, are of great importance physiologically and anatomically.

In the ovary, and afterwards in the fruit, the above order is reversed. The copal receptacles are most numerous and active, and are mostly localised in the mesocarp, whereas the special cells containing kino present in the same organ are few in number and of secondary importance.

From an examination of herbarium material the author finds that the two series of excretory organs are constantly present, and arranged in a characteristic manner in the different species of the genus.—*G. M.*

Diseases of Plants. By N. A. Cobb (*Agr. Gaz. N.S.W.* pp. 627–652, July 1903; pp. 681–712, August 1903; pp. 955–986, October 1903).—This article is based upon extracts from letters written in reply to requests for information on the subject, or some special branch of it, or from notes made during investigations undertaken in response to such requests. The drawings, both coloured and plain, have been made with unusual care, and may be relied upon as picturing with great fidelity the objects from which they were made. The disease referred to in the July number is 'Ripe Rot.' It shows that the 'Ripe Rot' or *Glœosporium* of Apple will grow on many other fruits. The article deals with the concentric arrangement of the pustules; description of the various inoculation experiments; 'Ripe Rot' fungi found growing naturally, and remedies for 'Ripe Rot.' The notes in the other numbers deal with the 'Banana Scab' and remedies; 'Stigmonose'; 'Shot-hole Stigmonose'; 'Mouldy Core' of the Apple; 'Quince Rots' and remedies; 'Black Rot' or *Alternaria* of the Quince; 'Canker'; 'Peach-curl' and its remedies and preventives; *Alternaria* of the Citrus tribe; 'Melanose' on Oranges and Lemons; 'Black Spot' of the Citrus fruits; Lemons decaying while on the market; diseases of the Passion Vine; faulty leaves on the Passion Vine; *Macrosporium* of the Passion Vine; *Pleospora* on Passion Vines; a Ripe Rot fungus on Passion Vines; diseases of the Walnut; Leaf-curl of the Potato; disease of Chillies; Onion disease; Root Rots and Timber Rots; disease in seed Potatos.—*H. G. C.*

Dodder (Cuscuta), Notes on. By W. Kinzel (*Nat. Zeit. Land-Forst.* i. pp. 104–110, and pp. 177–180; 1903).—Clover Dodder and most of the

other species begin to germinate in a few days, and even though grown on sterile sand the seedling may attain a size of ten inches and live a month. *Cuscuta europæa* is distinct from the rest. It only begins to germinate after two or three months, and even after the lapse of ten months the germination of new seeds proceeds slowly. Without respect to the time of sowing, the month of March has been found to produce more germinated seeds than any other month. *Cuscuta europæa*, grown on sterile sand produces a tiny seedling which soon dies unless transferred to a medium with some food-material, most of the quickly-germinating Dodders have a nitrogenous endosperm, while Clover Dodder and *Cuscuta europæa* have both a very minute starchy endosperm. The author discusses the relation between germination on the one hand, and the endosperm and hardness of the coat on the other.

The second paper deals with the origin of two large-seeded Dodders which in recent years have become very destructive in Europe. *Cuscuta racemosa*, an extremely common weed-seed in samples of Chilian Red Clover in Europe and Britain, is a native of South America, but not of North America. It is becoming common in samples of French Red Clover from Provence. *Cuscuta arvensis* is at present extremely common in Hungarian Red Clover. It is a native of North America, and although it is rarely found in samples from the United States or Canada, it was probably introduced into Hungary from those countries.—*W. G. S.*

Dogtooth Violets (*Journ. Hort.* September 19, 1903, p. 242).—It may not be generally known that these are amongst the easiest and most satisfactory bulbs to grow in the grass. Plant 6 inches deep where grass is not rank in growth.—*C. W. D.*

Dormant Seeds (*Journ. Hort.* October 8, 1903, p. 327).—A case is given of an excavation through a pasture-field in Hertfordshire where the ground contained many Roman remains. Scarlet Poppies, Henbane, and Rape, plants hitherto absent, came up in abundance. The subject has often been discussed.—*C. W. D.*

Draba Gilliesii. By Sir J. D. Hooker (*Bot. Mag.* tab. 7913).—Nat. ord. *Cruciferæ*, tribe *Alyssineæ*. Native of Chili. A perennial tufted plant, 1–10 inches long. Flowers $\frac{1}{2}$–$\frac{3}{4}$ inch diameter, white.—*G. H.*

Dry-rot Problems. By C. v. Tubeuf. (*Nat. Zeit. Land-Forst.* i. pp. 89–104; 1903).—An extremely useful paper, because it suggests possible lines of investigation on obscure points in the life-history of this destructive fungus. The late Robert Hartig regards the dry-rot fungus (*Merulius lachrymans*) to be (like the domestic mouse, &c.), a native of human habitations, rarely found except where there are buildings in which timber is used in the construction. It is important to know whether this fungus occurs in freshly felled timber, because if it does it can be introduced into new buildings with the timber. The number of authentic records of its being collected at any distance from dwellings is remarkably few; this paper records not more than a dozen cases in Germany in the nineteenth century. Professor Tubeuf requests mycologists to let him have any specimens of the dry-rot fungus collected in conditions free from con-

tamination from houses. Other important questions are raised. (*a*) Does the dry-rot fungus live as a parasite in living trees? Here, again, the information (collected in this paper) reveals scanty knowledge. (*b*) The germination of the spores; this has only been observed twice. (*c*) Has the fungus any other kind of spore besides basidiospores? A few cases suggest that this is possible. (*d*) How does it pass the winter? Hartig found that the house form of dry-rot was extremely sensitive to frost, drought, and heat; on the other hand, it lives in wooden roofs—is this a different form?—*W. G. S.*

Earth or Pea Nuts (*Arachis hypogæa*) (*Qu. Agr. Journ.* xii. p. 314, May 1903.)—There is likely to be a demand for earth nuts in Sydney, for oil making. One grower in Brisbane reports that his crop made a return of £35 per acre.

Further particulars are given (*Qu. Agr. Journ.* xii. p. 397, June 1903), and instructions for cultivation, also descriptions of the different varieties of the nuts (legumes), the selection of seed, the preparation of the land, sowing and harvesting of the crops, and machines employed in the operations.—*M. C. C.*

Echidnopsis somalensis. By W. B. Hemsley (*Bot. Mag.* tab. 7929).—Nat. ord. *Asclepiadaceæ*, tribe *Stapelieæ*. Native of Somaliland. One of six species known, from East Tropical Africa. It is a dwarf, fleshy, leafless plant, six inches high, with a furrowed and tesselated stem. Flowers, 4–5 inches diam., dark purple spotted with yellow.—*G. H.*

Ecological Study of the Flora of Mountainous North Carolina. By J. W. Harshberger (*Bot. Gaz.* vol. xxxvi. No. 4, p. 241; No. 5, p. 368).—After a brief description of the subdivisions of ridges and valleys, the hydrography and geology, the author discusses the physiographic changes influencing the distribution of plants, which afford an explanation of the peculiarities of the flora of the Southern Appalachians, which displays anomalies of distribution and isolation of monotypic plants. The author discusses the phenological distribution of plants, distinguishing four kinds, boreal, temperate, plants of warmer temperate and neotropic genera. He then discusses the influence of glaciers and the principles underlying the distribution of plants in Eastern America. The paper concludes with lists of plants, corresponding to relations of light, climate and soil, &c., and the mixed deciduous forest formation.—*G. H.*

Edgeworthia papyrifera S. & Z. By D. G. Fairchild (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.*, 42, p. 9, June 1903; 3 plates).—Is recommended for cultivation in the warmer parts of the United States, the bark being used by the Japanese in the production of paper. Its cultivation and the manufacture of different papers are described at length.—*E. A. B.*

Electric Pulsation accompanying Automatic Movements in *Desmodium gyrans.* By J. C. Bose (*Journ. Linn. Soc., Bot.* vol. xxxv. p. 405. figs. 1–11).—This paper is a sequel to that published in vol. xxxv., p. 275, of the same Journal "Electric Response of ordinary Plants under

Mechanical Stimulus." Full descriptions of the various experiments made and figures of the instruments used are given, but it is almost impossible to give a short abstract of the paper.—*G. S. S.*

Electricity, Trees felled by (*Le Jard.* December 20, 1903, p. 371). —Successful experiments have been made in felling trees by means of a platinum wire raised by electricity to a white heat. This method takes one-eighth of the time required to saw the tree down.—*C. W. D.*

Entomology in New Jersey, Economic. By J. B. Smith (*U.S.A. St. Bd. Agric. New Jersey, Rep.* 1902–3, pp. 101–8).—Mr. Smith points out the need for constant attention to *research* work in economic entomology. He reported on the partial success of the introduction of the Chinese lady-bird (*Chilocorus similis*) into New Jersey for the suppression of the San José scale. Mosquitos have been investigated during the year, and it is stated that they hibernate in cellars. The lime-sulphur-salt wash is recommended in preference to crude petroleum as a remedy against scale.—*F. J. C.*

Ericaceæ, Dehiscence of Anthers and Development of Seeds in. By A. Artopoeus (*Flora*, vol. xcii., 1903, pp. 309–345 ; 84 cuts).—In the *Ericaceæ* proper the rôle of dehiscence becomes specialised in the epidermis, which has thus the character of a true exothecium, while the endothecium progressively loses its function ; an intermediate state is that of *Erica* and *Rhododendron*, where tissue resorption alone determines dehiscence. *Clethra* remains in the primitive condition with a functional endothecium, while *Epacridaceæ* and *Pyrolaceæ* (including *Monotropa*) are at the other extreme. The nucellus produces a row of four megasporocytes, of which the hindmost is functional as the embryo-sac ; the rest of the nucellus is absorbed. Two multinuclear endosperm haustoria are formed, one at either pole, and grow into the micropylar thickening of the integument and the chalaza respectively ; traces of them may be found in the ripe seed. *Epacridaceæ* reveal a similar pair of haustoria. In the development of ovule to seed the *Ericaceæ* are true *Sympetalæ*.

M. H.

Ethereal Oils and Allied Substances : their Action on Plants. By Arthur Heller (*Flora*, vol. xciii., 1904, pp. 1–31).—The author's conclusions are of especial interest from the frequent use of ethereal oils, paraffin, and resin in insecticide spray ; and being the result of careful experiment we reproduce them. The vapour of ethereal oils and volatile hydrocarbons (such as paraffin) is very poisonous ; their action is less in the liquid state and when dissolved in water. Plants which secrete oils are more resistent to the action of their own oil. Ethereal oils can be taken up into the living cell. Ethereal vapours pass most readily into the plant through the air spaces ; the cuticle delays, but does not prevent, the entrance of the oil. The vapours are first dissolved in the water of imbibition of the cell-wall, and thence diffuse into its interior ; a dry membrane offers less resistance than a saturated one. Oil-producing plants exhale less oil when the conditions of life are unfavourable. Resins in solution are not absorbed into the living cell ; and paraffin is not taken up by the living moss or fungus (*Aspergillus Penicillium*).—*M. H.*

Eucalypts in African Steppe Regions, Notes on the Utilisation of West Australian. By Dr. L. Diels (*Not. König. Bot. Berlin, Bd. IV.*, pp. 67–70; August 30, 1903).—Practically a report on the author's experience of four species in West Australia, as regards climate and other conditions, and a suggestion that an experiment in the region referred to may succeed.—*H. M. W.*

Eucalyptus Hybrids. By Dr. Trabut (*Rev. Hort.* July 16, 1903, pp. 325–8; 3 woodcuts).—Description and illustrations of several interesting hybrids: *E. Rameliana* (*E. botryoides* × *rostrata*), *E. gomphocornuta* (*E. gomphocephala* × *cornuta*), and *E. Bourlieri* (*E. Globulus* × ?); all three spontaneous hybrids due to mixed collections.—*C. T. D.*

Eulophiella Peetersiana. By Ed. André (*Rev. Hort.* September 1 1903, pp. 403–5; coloured plate and 1 woodcut).—A very handsome terrestrial Orchid, bright pink flowers, sweetly scented, nearly 3 inches across individually, and forming a conspicuous erect panicle of twenty or more. Warm house, moist leafy soil.—*C. T. D.*

Eutrema Wasabi. By D. G. Fairchild (*U.S.A. Dep. Agr. Bur. Pl. Ind., Bull.* 42, p. 20, June 19, 1903; 1 plate).—Used by the Japanese in a similar way to the Western use of Horse-radish. A moist situation is necessary for its successful culture.—*E. A. B.*

Exacums. By W. T. (*Gard. Mag.* No. 2612, p. 771; 21/11/03).—This small genus of Gentianworts is described, the best ones selected, and cultural directions given.—*W. G.*

Experiment Station Work. (*U.S.A. Dep. Agr. Off. Exp. Stn.*, vol. ii. No. 2; 1903; figs.).—The results of experiments in :—

1. When to cut forage crops.
2. *Lippia nodiflora* as a lawn plant.
3. Pithiness in Celery.
4. Irrigation of Strawberries.
5. Farmers' fruit gardens.
6. Management of orchards.
7. Tropical and sub-tropical fruits.
8. China Asters.
9. Preserving Sweet Potatos.
10. Food value of Beans.

1. Analyses are given of the chemical composition of various feeding stuffs at various stages of growth, but the author points out that wholesomeness, digestibility, and other factors besides chemical composition must be taken into account in determining the comparative value of different foods.

2. *Lippia nodiflora*, or Fog Fruit, is described as having a remarkable capacity for resisting drought and extremes of temperature, and as possessing special advantages as a sand and soil binder. They report from the Arizona station that during the summer of 1902 *Lippia* maintained itself for eight months on the Mesa with less than 2 inches of rain.

It is easily grown, forms a smooth carpet of green, giving the effect of a White Clover lawn, though forming a more compact mass and not requiring the use of a lawn-mower. It will not bear much trampling on, but might be valuable for clothing steep banks facing south, where grass is very liable to get burnt up in summer.

3. It is complained that, in consequence of want of care on the part of American seedsmen, Celery from home-grown seed is liable to a pithiness which is not observable in plants grown from foreign seed.

4. Reports from the different States vary as to the advantages of irrigating Strawberries. In some districts the practice seems to be actually injurious, but in most of the Northern States it is proved to be of value.

Tropical and sub-tropical fruit are likely to be supplied in increasing quantities to the United States from their new island possessions, and a certain number are here described, and hints given on their culture out of doors. The list includes the Pomelo Grape Fruit or Shaddock, Peen-to Peaches, the Alligator Pear, the Roselle and the Surinam Cherry.

8. For the prevention of stem-rot and root-lice in China Asters (cure is impossible), it is recommended to start the plants out of doors rather than under glass, and, above all, never in soil where Asters have been grown before.

June 1 is not too late to sow the seed, and, as a general rule, the richer the soil the better will be the Asters.

9. A method of boiling and evaporating Sweet Potatos is described, the crop having hitherto been one which, while cheap and nourishing, was too bulky and too perishable to pay for transportation to any distance.

10. Beans are declared to be amongst the cheapest foods for supplying protein, but their digestibility is much increased by the skins being removed. On the whole they represent a food more suited to a man in active work than to one of sedentary habits.—*M. L. H.*

Fendlera rupicola. By W. B. Hemsley (*Bot. Mag.* tab. 7924).—Nat. ord. *Saxifragaceæ*, tribe *Hydrangeæ*. Native of S.-W. North America. A highly floriferous shrub of dry, rocky regions. The leaves clustered on short lateral branchlets, opposite. Flowers $1\frac{1}{4}$–$1\frac{1}{2}$ inch diam. 4-merous, stamens 8, petals white.—*G. H.*

Ferns, British Names of. By C. T. Druery (*Gard. Chron.* No. 861, p. 418: June 27, 1903).—The origin of the popular names of British Ferns is fully dealt with in this paper. There seems to be almost as much confusion about them as there is among the scientific ones. After having given the derivations of the English names and comments on the others, the author says: "So much for the popular and botanical names of our native species, whence it is abundantly clear that the former are more natural as a rule, and less open to dispute than the latter. To deal fully with the varietal names would demand more space than this article permits or the general reader would care to traverse, since, while the species number about forty-four only, the varieties run into a couple of thousand."—*G. S. S.*

Fertilisers, Commercial (*U.S.A. Exp. Stn. Vermont, Bull.* 99, 5/1903).—Gives analyses of fertilisers and a considerable amount of

valuable advice *re* buying and using fertilisers. The form of guarantee often given with fertilisers is commented upon, and the following example is quoted :—

Nitrogen	0·82–1·64
Nitrogen as ammonia	1·00–2·00
Soluble phosphoric acid	6·00–7·00
Reverted phosphoric acid	2·00–3·00
Insoluble phosphoric acid	1·00–2·00
Total phosphoric acid	10·00–12·00
Bone phosphate of lime	22·00–25·00
Available bone phosphate of lime	18·00–20·00
Available phosphoric acid	8·00–10·00
Potash	4·00–5·00
Equivalent to sulphate of potash	8·00–10·00

This lengthy guarantee gives in its simplest terms :

Nitrogen	0·82
Available phosphoric acid	8·00
Potash	4·00

Such statements are misleading if only through their length, and the bulletin perhaps voices a needed warning to purchasers in this country.

F. J. C.

Figs, Forcing in pots. By G. Wythes (*Gard. Mag.* No. 2597, p. 523 ; 8/8/03).—An excellent account of the methods of forcing Figs in pots at Syon House. The best varieties are enumerated, and details of culture are given.—*W. G.*

Flax and Seed Selection. By L. H. Bolley (*U.S.A. Exp. Stn. N. Dakota, Bull.* 55, 1903).—A brief retrospect of the annual production of Flax seed in North Dakota and a comparison with that of other States, the former nearly equalling the whole of the latter combined. This rate of production is attributed largely to the virgin soil, which, however, is found to diminish after a few crops have been gathered. The question as to whether the Flax should not be grown for its fibre in addition to its seed is discussed. Flax, *Linum usitatissimum*, thrives in all temperate regions. Russia, however, produces more fibre than all other countries combined, the United States and British India being close behind in seed production. Of 29,184,000 bushels produced in U.S.A. during 1900, North Dakota alone was responsible for 13,000,000 bushels. Owing to early autumn frosts in 1902, the estimated damage was from 11 to 14 million bushels of seed, which would have otherwise increased in one year to 25 million bushels. Continued cropping also had considerable effect on the yield per acre, and in some areas the crop was almost a total loss owing to the wilt disease. Up to this time the greater part of the seed used was of a mixed kind of inferior quality, and in many cases it was not considered free from spores of the disease. The principal cause of disease was *Fusarium lini*. A second species (unnamed) possesses also the same destroying power. There are also species of *Colletotrichum* and *Alternaria* which attack plants in young stages. The remedies recommended are (1) to obtain

clean and pure seed, which should be properly treated with a spore-destroying solution before sowing; (2) the necessary rotation of crops to allow time for the land to recover from Flax wilt sickness; and (3) to keep all Flax straw away from the manure yard, as by this means spores are largely disseminated.—*E. F. H.*

Flower Beds, Permanent. By Alger Petts (*Gard. Mag.* No. 2595 and No. 2596, pp. 491 and 508; 25/7/03 and 1/8/03).—A practical article on the formation, planting, and general management of perennial flower-borders. The writer describes the method he follows in order to produce a succession of bright effects in the open-air garden.—*W. G.*

Flower Emblems and Legends. By J. A. Carnegie Cheales (*Gard. Mag.* No. 2598, p. 542; 15/8/03).—An interesting article on emblems, legends, and folklore of common flowers.—*W. G.*

Fly, White (*U.S.A. Exp. Stn. New Hampshire, Bull.* 100, 3/1903; and *Florida, Bull.* 67, 6/1903; 6 plates).—The white fly (*Aleyrodes* sp.) is, in the first paper quoted, said to do much mischief to plants in greenhouses. A life-history of the species most commonly occurring in greenhouses (see JOURN. R.H.S. xxvii. p. 1202) is given, showing that the whole life cycle is completed in about a month. In New Hampshire the pest does not establish itself seriously outdoors, but attacks Tomatos and Cucumbers particularly, although not confined to these plants, especially in forcing-houses. Spraying with a mechanical mixture of kerosene (5 per cent.) and water killed both adults and nymphs, but might be injurious to the plants attacked. Fumigation with hydrocyanic-acid gas was most effectual, 1 oz. of potassium cyanide to 400 cubic feet of greenhouse space, the house being kept closed for *nine minutes*. This treatment was sufficient to kill all the adult insects, and not long enough to injure the Tomato and Cucumber plants which were the only ones experimented with.

In the second bulletin the white fly (*Aleyrodes citri* Ashmead) which attacks Citrus trees is thoroughly described and well figured; its life-history (3 annual broods), modes of dissemination (wind, animals, and man), and its native home are discussed. It is regarded as the worst pest of the Orange in Florida. *Gardenia*, *Ligustrum*, *Diospyros*, &c., are also subject to its attacks. Death of the trees rarely occurs through the attacks of the white fly alone, but the yield of fruit is greatly reduced, and ripening delayed. The honey-dew is quickly followed by the sooty mould (*Meliola camelliæ* Sacc.), a fungus which grows upon it, finally covering the leaves and greatly interfering with their functions. The insect can withstand a greater degree of cold than the Orange, and the natural insect enemies of the white fly seem to be almost absent from Florida. Three species of fungi, the "brown fungus" (not named so far), *Aschersonia aleyrodis* Webber, and *Sphærostilbe coccophila* Tul., attack the insect, and frequently very successfully. It is recommended that a tree upon which the insects are well attacked by the fungi should be transplanted into infected groves as a means of spreading this remedy.

Spraying with the following solution is advocated:

Resin pulverised	20 lbs.
Caustic soda, granulated 98 per cent.	$4\frac{1}{4}$ lbs.
Fish oil	3 pts.
Water for final bulk	150 gals.

Crude caustic soda, 4 lbs., and fish oil, $2\frac{1}{2}$ pts., may be substituted in above to make a cheaper spray. Kerosene is effectual against the insect, but somewhat uncertain in its effects upon the tree; whale oil soap is also very useful. Neither tobacco decoction nor sulphur, camphor balls nor light traps, are of any utility, while fighting against adults is foredoomed to failure. Spraying is best done in December and January (in Florida). Fumigation with hydrocyanic-acid gas may be employed with advantage, but is more costly than spraying. General notes on nursery fumigation conclude this section of the bulletin. At the end Prof. Cockerell gives a summary of the characteristics and distribution of *Aleyrodidæ*, together with descriptions of two new species, *Aleyrodes perileuca* and *A. melanops*.

F. J. C.

Forest Destruction. By Gifford Pinchot and C. Hart Merriam (From *Smithsonian Report for* 1901).—Unfortunately, the first act of the settler in many forest regions is the wholesale destruction of the timber which either confines or restricts his industry. Not only in the United States has this been the case, but in Norway and Sweden, as well as many other Continental places, indiscriminate felling and clearing of the natural forests has gone on unchecked. The far-reaching evil consequence of such wholesale clearings is forcibly brought before the reader of this pamphlet, while a number of excellent illustrations clearly show the ultimate doom of the tract of country so denuded of its forests.

Much has, however, been done of late years towards the conservancy of woods and plantations, and already in several parts of North America the good results of State interference in the matter of judicious and regular thinning of the forests is bearing excellent results.

But, unfortunately, the wholesale destruction of the forest means destruction of the fauna and flora as well—a fact that is dealt with thoroughly by Mr. Merriam.—*A. D. W.*

Forest Planting in the United States. By William L. Hall (*Yearbook U.S. Dep. Agr.* 1902, p. 133).—The conditions under which this may be made profitable are discussed. In America no farm can be considered complete without a portion of wood attached. These portions will not reproduce themselves unless stock is fenced out.

Taking White Pine as the most profitable tree to plant, which matures at forty years, and deducting the cost of making and fencing, to accumulate at $3\frac{1}{2}$ per cent. compound interest, a profit is shown at the end of forty years of ninety dollars (or about 18*l.*) an acre, on land which would otherwise be practically worthless.—*C. W. D.*

Forestry, A Primer of. By G. Pinchot (*U.S.A. Dep. Agr., Farm. Bull.* 173, 1903; 33 figs.).—An interesting and instructive popular account of the life of a tree, trees in the forest, the life of a forest, and the enemies of a forest, published with the object of creating a better understanding of

the requirements of forest land among the agricultural population. 45,000 copies have already been circulated.—*F. J. C.*

Forestry and the Lumber Supply. (*U.S.A. Dep. Agr. Bur. Forestry, Circ.* 25).—President Roosevelt declares that forestry is "in many ways the most vital internal problem in the United States," and that "the very existence of lumbering depends upon the success of our work as a nation in putting practical forestry into effective operation." The President, in his address before the Society of American Foresters, went thoroughly into the question of "Forestry and Foresters," and pointed out how extremely intimate was the relation between the forests and the mineral industry, for on lumbering depends the success of the United States as a nation in putting practical forestry into effective operation. The exhaustion of the lumber supply is the subject of another interesting chapter, for there was probably no forest in the world so immense, so accessible, and so regular in the high quality of its timber as the extensive pinery which occupied the region of the Great Lakes and Upper Mississippi.—*A. D. W.*

Frost, Resistance of Beans to. By F. W. Card and L. P. Sprague (*U.S.A. Exp. Stn. Rhode I., Rep.* 1902, pp. 232–242).—An endeavour is being made to raise Beans which shall be frost-resisting, but has met with little success so far. Interesting details of experiments are given.

F. J. C.

Fruit Census of Connecticut (*U.S.A. Exp. Stn. Conn., Rep.* 1902, pp. 432–443).—This return gives the acreage under bearing trees and under young trees, and the number of trees and estimated crop for 1902, in the various counties of the State. There are 187,008 Apple trees (50,876 newly set), occupying 4,717¼ acres and yielding 353,508 bushels of fruit, and 586,760 Peach trees (180,520 newly set), four times as many as ten years ago, occupying 3,616 acres and producing 312,174 bushels of fruit. The remainder of the 9,664½ acres under fruit is devoted to the growing of various fruits for the most part similar to British ones, and includes 198⅓ acres of Strawberries and 123⅓ acres of Japanese Plums. Only well-tilled orchards are included in the above return. [The area of Connecticut is 5,004 square miles, and the population in 1900 was 908,420.—*F. J. C.*

Fruit Crops, Report on the Condition of. Anon. (*Gard. Chron.* No. 866, p. 72; Aug 1, 1903).—A long table is given of the reports of nearly 270 correspondents of the state of the fruit crops in various parts of this country, and comments are made on the reports in a leading article on p. 78, in which the writer says: "Never, since we made a practice of recording the condition of the fruit crops, a period of nearly forty years, have we had to present so disastrous a record. From John o'Groat's house to the Land's End, from Galway to East Anglia, the tale is the same. With the exception of Strawberries and small fruit, the words 'total failure' best express the condition of affairs." The reports are given in the six following numbers, on pages, 96, 112, 135, 155, 174, 189.—*G. S. S.*

Fruits, List of, for the Various Districts of Illinois (*Trans. Ill. Hort. Soc.* 1902, p. 20).—A useful list of the best varieties of Apples, Pears, Peaches, Cherries, Plums, Blackberries, Raspberries, Grapes, Gooseberries, Currants, and Strawberries; prepared and recommended by the horticultural society of each district of Illinois.—*E. F. H.*

Fruits, Promising New. By William A. Taylor (*Yearbook U.S. Dep. Agr.* 1902, p. 469).—We have here coloured portraits and descriptions of six new fruits: two Apples, viz. 'Stayman Winesap,' a late Apple, and 'Randolph' Apple, an early kind; a late Pear, 'Philopena'; a Peach called 'Belle,' especially good for light and dry soils; and the 'Brittlewood' Plum, producing good crops where temperature often falls below −20° Fahr.; also a Jordan almond introduced from Spain.—*C. W. D.*

Fruit-trees in Grass (*Journ. Hort.* September 24, 1903, p. 290).—Experiments show that Apples and Pears planted in grass do not grow so quickly or so robust as when the soil is bare.—*C. W. D.*

Fruit Varieties, Little Known. By W. A. Taylor (*Yearbook U.S. Dep. Agr.* 1901, p. 381; plates).—An interesting paper showing the qualities of various fruit varieties which could under suitable conditions be more widely cultivated in the United States. There are the Ingram Apple, the M'Intosh Apple, the Carman Peach, the Red June Plum, Wickson Plum &c. Most of the varieties mentioned have been introduced from Europe and other parts of the Old World, and full particulars, together with coloured illustrations, are given, so that their growth may be undertaken. The Mulgoba Mango and the advance Loquat are described.

V. J. M.

Fumigation. By W. J. Allen (*Agr. Gaz. N.S.W.* pp. 597–606; July 1903).—"Owing to the great diversity of opinion which has existed as to the efficiency of the several solutions recommended and used for spraying trees, and the necessity, even after a satisfactory spray had been found, of repeating the operation so often in a short period of time, a large number of our Citrus-growers have abandoned this method of fighting scales of different sorts and have substituted fumigation, with, I am pleased to say, in nine cases out of ten, highly satisfactory results. There have been some, as there always are in every experiment of the kind, who have not been successful, and therefore condemn unhesitatingly, while the chances are the fault has been with themselves, either in fumigating at the wrong time or in not exercising due precautions in the carrying out of the work.

"Among some of the causes of failure which have come under my notice, and which, wherever it has been possible, I have made a point of finding out, are: first, underestimating the size of the tree; second, fumigating at the wrong time; third, neglect to see that the tents were free from holes; fourth, carelessness in weighing the cyanide; and fifth, an insufficient quantity of sulphuric acid to dissolve the cyanide.

"This treatment, like any other, requires to be carried out carefully and systematically, and there must be no trusting to guesswork, or it cannot be expected that the operator will be as successful as his more careful neighbour who, by the exercise of a little patience and discretion, without

any apparent trouble, rids his trees and fruit not only of scales but of the black and disfiguring smut."

With reference to those cases where fumigation has not proved entirely satisfactory, owing to—First, underestimating the size of the tree: in measuring the tree it is necessary to get the extreme height and width. Second, time for fumigating: while fumigating can be carried out at almost any time of the year, the best results are obtained by fumigating in the latter part of January or February, and the work is best carried out at night. Third, holes in the tent: always see that the tents are patched and free from holes before starting to fumigate, otherwise the holes provide an escape for the fumes and the work is not done properly. Fourth, care in weighing the cyanide and sulphuric acid: the greatest care should be exercised in having the chemicals accurately measured out.

Descriptions of tents are given and a series of fumigating tables, showing the quantity of chemicals and water required for various-sized trees.

H. G. C.

Fungicides, Some newer. By B. D. Halstead and J. A. Kelsey (*U.S.A. Exp. Stn. New Jersey, Bull.* 167, 6/1903; 3 figs.).—Bordeaux mixture, in which scarcely more than enough lime is used to neutralise the acidity of the copper sulphate, is recommended for the treatment of ornamental plants. The mixture should be tested with red litmus; if the litmus turns blue it is fit for use; if not, lime should be added until the mixture becomes alkaline, and the red colour of the litmus becomes blue.

Soda-Bordeaux.

This has had an extensive trial, lasting over several years, on *Æsculus*, Hollyhocks affected with *Cercospora althæina* Sacc., *Helianthus annuus* L. affected with *Puccinia tanaceti* DC. &c., and the results fully justify its use with rust fungi and grape-rot.

The solution used at the station was

Soda (Lewis' Lye) . . .	. 1 "pound" can.
Copper Sulphate . . .	. 3 lbs.
Lime	. 5 oz.
Water	. 30 gallons

The amount of copper sulphate to be used will vary with the brand of soda used, the strength of which must be ascertained. Dissolve about 2 lbs. of soda in one gallon of water, make up "to 15 gallons and pour slowly into 10 gallons of copper sulphate solution. Stir thoroughly, and when about two thirds of the soda has been added, test frequently with red litmus. As soon as there is a change in colour, from red to blue, cease adding the soda solution. Add slaked lime in the form of a thin whitewash at the rate of 5 ounces to 3 gallons. Dilute this solution to 10 gallons of water to one pound of copper sulphate, and it is ready for use."

In Ohio (*Ohio Exp. Stn., Bull.* 130, Jan. 1902), Professors Selby and Hicks have found the Soda-Bordeaux very effective against their grape-rot. Their formula is:

Copper sulphate	4 lbs.
[1] Caustic soda (commercial) . . .	1 lb. 4 ozs.
Water	50 gallons.

FORMALIN.

Use formalin at the rate of one pound of the liquid to forty-five gallons of water. Apply the water solution to the seed grain in any manner which allows all grains to become moist. For the treatment of seeds for smut and for Potato scab.

The solution for Wheat, Oats, Barley, and Millet is made by dissolving 1 lb. formalin (or 40 per cent. formaldehyde, the form in which it is usually sold) in 45 gallons of water. Wheat takes about $\frac{3}{4}$ gallon of the solution to the bushel, the others from 1 to $1\frac{1}{2}$ gallon to the bushel.

For Potato scab, the tubers are soaked for two hours in a solution of 1 lb. of formalin in 30 gallons of water.

"For Onion smut, use 1 lb. of formalin in 25 to 33 gallons of water and apply with drip attachment on seed drill at rate of 500 to 700 gallons of solution per acre for Onion set seeding (about $\frac{1}{5}$ to $\frac{1}{4}$ as much for field Onions), or apply with sprinkler upon the scattered seeds until well moistened, then cover with earth promptly."

KEROSENE EMULSION.

This solution has been in use for three years with very good results. It has been tested against the powdery mildew on Phlox, Verbena, and *Plantago Rugelii* Decne. (probably *Erysiphe cichoracearum* DC.), and on Roses (probably *Sphærotheca humuli* DC.).

The mixture was made according to the following formula:

Kerosene	2 pints.
Ivory soap	1 oz.
Water	8 gallons.

The ivory soap is dissolved in one gallon of boiling water; after removing from the fire the kerosene is added, and the sufficient amount of water, properly mixed to a creamy emulsion. For the application of small quantities an atomiser was used, and for larger quantities a knapsack pump was employed.

It was found that the mixture could be satisfactorily prepared by drawing the solutions for about ten minutes through a knapsack pump.

F. J. C.

Fungous Diseases and Spraying. By H. H. Lamson (*U.S.A. Exp. Stn. New Hampshire Bull.* 101, April 1903).—General instructions on fungicides and spraying—in Apple-scab, sooty spot, brown spot, leaf-spot, on Blackberry-rust, and for diseases of Cherry and Plum; downy mildew of Cucumber and Grape, brown and black rot of Grapes, Peach leaf-curl, Peach yellow, Pear-scab sooty spot, Fire-blight, Potato-blight, Potato-scab, and Oak-smut.

In the majority of cases Bordeaux mixture is recommended.—*M. C. C.*

[1] Amount varies according to strength.

Fungus attacking seedling Conifers. By Geo. Massee (*Gard. Chron.* No. 882, p. 347, figs. 144, 145; Nov. 21, 1903).—Larch seedlings are liable to be attacked by a fungus known as *Melampsora laricis*, which in one stage of its existence is parasitic on the leaves of the common Birch, in the form of a yellow rust. In many cases the young Larches are severely injured or killed outright by this fungus. Another species belonging to the same genus, *M. pinitorqua*, commonly known as the "Pine-branch twist," is very injurious to the shoots of seedling Pines, causing them to twist and become contorted. The other stage of this fungus is very common on the leaves of Poplars. "Moral: do not form a nursery of Conifers in a locality where Birches or Poplars abound."—*G. S. S.*

Gentiana lutea (*Gard.* p. 59; 25/7/03).—The leaves are broadly ovate, large, forming a rather dense tuft some 12 to 18 inches high. The flowering stems, which are from 3 to 4 feet high, have numerous large leaf-bracts oppositely arranged. In the axils of these the yellow flowers are freely produced in bunches in June and July. The growths usually flower when two years old.—*E. T. C.*

Geranium argenteum. By S. Arnott (*Journ. Hort.* June 18, 1903, p. 640).—This very choice rockery Geranium, from the Swiss and Italian Alps and the Pyrenees, is described, and rules given for its successful cultivation.—*C. W. D.*

Geranium grandiflorum. By Rev. C. Wolley Dod, V.M.H. (*Gard.* p. 184; 12/9/03).—A good specimen of this Geranium is illustrated. It is a Himalayan plant, of great merit as a garden ornament. The flowers are much larger and more blue than those of *G. palustre*, and the growth is dwarfer and of better habit than *G. pratense*, of which species some have thought it to be a local variety. It grows on level borders in any rich, well-drained soil, but gardeners must find out for themselves the best position for it in their own gardens.—*E. T. C.*

Gloriosa Leopoldi. By Ed. André (*Rev. Hort.* Dec. 1, 1903, pp. 548–9; coloured plate).—A splendid, clear yellow form, with flowers 7 or 8 inches across, produced freely. Culture same as with other species of same genus, *i.e.* warm house, water freely when flowering, then dry off and store tubers until February in fine dry sand.—*C. T. D.*

Gloriosa Rothschildiana. By J. O'Brien (*Gard. Chron.* No. 856, p. 322, fig. 125; May 23, 1903).—A description and figure are given of a remarkably fine new species of *Gloriosa* which was collected by Major H. B. Rattray in Uganda, and which has been flowered by the Hon. W. Rothschild at Tring Park. "Its pure glowing crimson-coloured flowers constitute it one of the showiest of warm-house plants." Short descriptions of other species of this genus are given, showing how they differ from one another and from the subject of the present article. A brief note as to the cultivation of these plants is also given.—*G. S. S.*

Gnetum Ula, Brongn. Parthenogenesis in. By J. P. Lotsy (*Flora*, vol. xcii., 1903, pp. 397–404, t. ix., x., and figs. 1–3).—In *Gnetum*

Gnemon the free-cell formation in the embryo-sac eventuates in the formation of a compact cell-mass in the lower part, and a parietal layer above, whose cells separate as individual oospheres, and by fusion with the generative nuclei of the pollen-tubes into embryos. In *G. Ula* the upper cells of the embryo-sac separate to develop individually as embryos, though no pollen-tubes can be found. The nuclei of these show direct as well as mitotic divisions. Only one of the embryos is functional and attains full development.—*M. H.*

Grafting, Effect of, on Duration of Plants (*Rev. Hort.* June 1, 1903, p. 247).—M. Lucien Daniel grafted *Solanum pubigerum*, perennial, on the Giant Tobacco, annual in France, with the result that the combination continued active growth beyond the annual period. Similar results have been obtained with various *Compositæ*, the flowering period being greatly lengthened.—*C. T. D.*

Grape 'Président Gaston Chandon.'—By G. T. Grignan (*Rev. Hort.* September 16, 1903, pp. 428; coloured plate).—An improved seedling of 'Gros Coulard,' of which it has all the good qualities *minus* the defect of imperfect flowering.—*C. T. D.*

Grapes and Melons in the Channel Islands (*Gard.* p. 317; 7/11/03).—It is safe to say that the Grape introduced the Channel Islands as a fruit-growing district to the English markets, and it illustrates in a striking manner how pregnant with results are those matters which sometimes appear of small importance at the moment. This article gives full particulars of this Channel Island industry, the methods of culture practised, the varieties grown, &c.—*E. T. C.*

Grapes, their Cultivation in the U.S.; also the Production of Raisins and Wine. By George C. Husmann (*Yearbook U.S. Dep. Agr.* 1902, p. 407).—A full account is given of all connected with the cultivation of the Vine in the U.S. and the produce of Grapes, Raisins, and wine. The commercial aspects and future prospects are discussed.

C. W. D.

Grasshoppers. By C. P. Gillette (*U.S.A. Exp. Stn. Colorado, Bull.* 19, 4/1903; 2 figs.).—These do very great damage to tender parts of plants in spring, and occasionally to the leafage of trees. The remedies suggested are (1) deep ploughing for the destruction of the eggs; (2) burning along hedges, &c., where the young insects are abundant; (3) poisoning by spraying crops with Paris green or other arsenite, or by sowing arsenic-bran mash among crop; (4) banding trees to prevent their ascent; (5) catching in a shallow tank of petroleum carried over the field so that insects may leap into it; (6) by propagation of grasshopper diseases. [The African grasshopper disease was spread extensively about Colorado in 1902, but seems to have had little fatal effect.]—*F. J. C.*

Green Fly Remedies. By R. Thiele (*Zeit. f. Pflanz.* xiii. pp. 147–157; 1903).—In tabulated form, the author gives results obtained by him with eighty preparations said to be remedies for green fly. Thirty of

the most useful are given, and their preparation and application described. Amongst the best are water, sprayed on with considerable force, and various mixtures with petroleum, carbon bisulphide, and soft soap. The author prefers the water treatment before any other.—*W. G. S.*

Green Manuring, Experiments. By Otto Pitsch (*Ann. Agr.* p. 59 ; Jan. 1902).—Comparative value of various crops :

Common Vetch (*Vicia sativa*).	.	added 225	kilos of nitrogen
Canadian Vetch (*Vicia canadensis*).		„ 115	„
Peas		„ 205	„
Blue Lupins		„ 151	„
White Lupins		„ 115	„
Yellow Lupins		„ 115	„

C. H. H.

Hedysarum multijugum (*Die Gart.* p. 574, August 29, 1903).—The most beautiful and interesting of the whole genus. A shrub flowering from spring till autumn. The leaves are pinnate and the flowers are crimson-purple.—*G. R.*

Helichrysum campaneum and H. lepidissimum. By Spencer Moore (*Journ. Bot.* 492, pp. 399–400 ; 12/1903).—Descriptions of two new species, collected at Johannesburg by Dr. Rand.—*G. S. B.*

Helleborus lividus. By Sir J. D. Hooker (*Bot. Mag.* tab. 7903).—Nat. ord. *Ranunculaceæ*, tribe *Helleboreæ*. Native of Majorca. This plant was inaccurately figured in 1789 (*Bot. Mag.*), having been in cultivation since 1710. It is a robust plant, with fleshy stems mottled with red. Flowers $2\frac{1}{2}$ inches across, of a dull purple-grey colour.—*G. H.*

Hemp Industry in the United States. By L. H. Dewey (*U.S.A. Dep. Agr. Year Bk.* 1901, p. 541 ; plates).—A good and well illustrated article on this subject, dealing with the principal uses of Hemp, soils suitable, preparation of land, breaking, seeds and varieties, &c. The Hemp Plant (*Cannabis sativa*) is an annual belonging to the Nettle family. It grows to a height of from 5 to 15 feet, and when cultivated for fibre produces only a few small branches near the top of the slender stalk. The fibre consists of numerous series of long cells in the inner bark, firmly knitted together, which when cleaned from the surrounding tissues form tough strands nearly as long as the entire plant. The Hemp plant originated in Central Asia, but it is now widely distributed, especially in the North Temperate Zone.

The fibre is especially adapted for use where strength is required, and is used in the manufacture of fine twines, carpet thread, sailcloth, &c. Hemp is cultivated in Russia, China, Japan, Italy, Austria, France, and in Kentucky in the United States. The best grades of fibre are grown in Italy. As to preparation of soil, a common five-year rotation is Clover, Hemp, Corn, Wheat, and Clover.

Hemp is cut when the staminate plants are in flower. The time of harvest varies from 80 to 140 days from seeding, depending on the temperature and moisture.

Retting is dealt with, and also breaking, the latter being the process by which the fibre is separated from the stalk and roughly cleaned.

The subject of marketing is fully dealt with, and tables are given showing the production in Kentucky, prices, &c.—*V. J. M.*

Hexadesmia crurigera (*Orch. Rev.* Nov. 1903, p. 329, fig. 49).—Historical particulars accompany the illustration, taken from a plant while in flower in the Botanic Gardens, Glasnevin.—*H. J. C.*

Hippeastrum vittatum (L.), **Twin flower of.** By P. Magnus (*Gartenflora*, 1/7/03, p. 345; figs. 49–51).—The twin flower had ten petals, ten stamens, and united double stigma.—*J. P.*

Hoar-frost, Fertilisation by. By P. Hariot (*Le Jard.* March 20, 1903, p. 153).—It is stated that hoar-frost contains extra nitrogen, which it filters from the atmosphere, and so becomes a fertilising factor.

C. W. D.

Huernia concinna. By Sir J. D. Hooker (*Bot. Mag.* tab. 7905).—Nat. ord. *Asclepiadaceæ*, tribe *Stapelieæ*. Native of Somaliland. The stems are clustered, 1–2½ inches long, 5-angled, and spiny. The corolla is broadly campanulate, about 1 inch across, yellowish-white, covered with bristle-like appendages on upper surface, pale yellow dotted with brown.—*G. H.*

Humea elegans (*Journ. Hort.* December 29, 1903, p. 582).—It has been noticed that the gum-scented effluvium from this plant poisons plants near it, causing, for instance, Peach trees to lose their young leaves.—*C. W. D.*

Hybridisation, International Conference on Plant Breeding and (*Bull. Dep. Agr. Jam.* vol. i., pt. 3, p. 56).—Reviews of papers by Professor W. Bateson, C. C. Hurst, Hugo de Vries, and American botanists, as well as by Sir Daniel Morris on the Cross Fertilisation of the Sugar-cane in the West Indies. The whole constitutes a valuable contribution to the literature of hybridisation.—*G. H.*

Hydrangeas (*Gard. Mag.* No. 2600, p. 577; 29/8/03).—An excellent account of the Hydrangeas in cultivation, with a brief descriptive note on each, with hints upon their cultivation. Illustrations of *H. Hortensia* and its beautiful variety *Mariesi* are given.—*W. G.*

Hydrangeas, Standard. By E. Piedoye (*Rev. Hort.* August 1, 1903, pp. 362–3; 3 woodcuts).—Description of method of forming compact-headed standards by choosing strongest roots, suppressing all others, and subsequently pinching out the top so as to form a standard bush.—*C. T. D.*

Hypericum (*Journ. Hort.* September 3, 1903, p. 215).—A useful compendium, with brief description of the hardy shrubs of this genus, cultivated at Kew.—*C. W. D.*

Hypsophila Dielsiana Loesener (*Not. König. Bot. Berlin, Bd. IV.*, p. 62, July 10, 1903).—A technical description of this member of the *Celastraceæ*, from Queensland.—*H. M. W.*

Hypostase, The. By Ph. van Tieghem (*Ann. Sc. Nat.* (*Bot.*) xvii. pp. 347–362; 1903).—The object of this paper is to draw the attention of workers on the anatomy of the ovule, seed, and fruit to the necessity of making accurate observations on the hypostase. This is a layer of cells lying below the embryo-sac of the ovule of flowering plants. This layer is distinguished by the cell-walls becoming gradually lignified, and shows the usual reactions with iodine green or fuchsin. The position of the hypostase is said to determine whether the seed will have a perisperm. A few examples are given to bear out the suggestions made.—*W.G.S.*

Ilex Species: the Differentiation of their Leaves. By Camillo K. Schneider (*Gartenflora*, 1/9/03, p. 452; figs. 62 and 63).—A descriptive table by means of which the different species of *Ilex* may be recognised by the leaves. Illustrations of the leaves are given.—*J. P.*

Impatiens falcifer. By Sir J. D. Hooker (*Bot. Mag.* tab. 7923). Nat. ord. *Geraniaceæ*, tribe *Balsamineæ*. Native of Sikkim Himalaya. Flowers 1–1½ inch long, golden-yellow spotted with blood-red, excepting the anterior petals.—*G. H.*

Indigofera, Tropical African Species of. By E. G. Baker (*Journ. Bot.* 487, pp. 234–245; 488, pp. 260–267; and 490, pp. 323–334; 7, 8, and 10/1903).—A systematic enumeration, describing as new *I. sericea* forma *australis*, collected by R. F. Rand at Buluwayo; *I. sparsa*, var. *bongensis*, collected by Schweinfurth in Bongoland; *I. brevicalyx*, collected by Schimper at Dembea, Abyssinia, in 1863; *I. laxeracemosa*, from Mozambique; *I. Zenkeri*, from the Cameroons, Nyassaland, and Zanzibar; *I. viscosa*, var. *somalensis*, collected by Dr. Donaldson Smith in Somaliland; *I. vohemarensis*, var. *multiflora*, collected by Buchanan in Nyassaland, and var. *angolensis*, collected by Welwitsch; *I. wituensis*, collected by Thomas in Witu; *I. stenophylla*, var. *Nyassæ*, collected by Buchanan in Nyassaland; *I. Heudelotii*, var. *Elliotii*, collected by Scott Elliot at Sherboro and Samu; *I. heterotricha*, var. *rhodesiana*, collected by Dr. Rand at Buluwayo; *I. pseudosubulata*, collected by Schweinfurth in Niam-niam Land; *I. Phillipsiæ*, collected by Mrs. E. Lort-Phillips in Somaliland; *I. Kaessneri*, collected by T. Kaessner at Gaditu, East Tropical Africa; *I. secundiflora*, var. *Holstii*, collected by Holst at Usambara, East Tropical Africa; *I. daleoides*, var. *dammarensis*, collected by T. G. Een in Dammaraland; *I. longemucronata*, collected by Rev. W. E. Taylor in the Giryama and Tsimba Mountains, East Tropical Africa, in 1887; all represented in the British Museum Herbarium.—*G. S. B.*

Injurious Insects in Montana. By R. A. Cooley (*U.S.A. Exp. Stn. Rep.* 1902, pp. 80–87).—A list of 29 native and 27 introduced insects which are commonly injurious to plants in Montana is given. The Cottonwood Leaf-beetle (*Lina scripta* Fabr.) is injurious particularly in the larval state, to leaves of Willow and Cottonwood. The perfect insect somewhat resembles the Colorado beetle, but is flatter and from 3 to 4 lines long. Paris green (1 lb. to 100 gallons of water) sprayed on the foliage is a good remedy. The cucumber flea-beetle (*Epitrix cucumeris* Harris) did great damage to Potato foliage in many places. Bordeaux

mixture with Paris green or slaked lime and Paris green is recommended as a spray. A small ant was very troublesome as a fruit pest. Pouring carbon bi-sulphide into the nest, taking care not to bring a light near the vapour, was recommended as a remedy.—*F. J. C.*

Injury of Leaves by Wind, Experimental Researches on. By J. Hansen (*Flora*, vol. xcii. 1903, pp. 32–50, t. i.).—In this preliminary research the author produced, by a fan, a steady wind, between 1 and 2 of Beaufort's scale (*i.e.* 8–13 miles per hour), to pass through a case in which was a pot with a growing plant.

The effect was the drying up of the margins, affecting masses of tissue near the finest terminations; and the spots soon turned brown. As withering by ordinary desiccation has not the same effect, it is obvious that some other physical effect than excessive evaporation must induce this. The author suggests that the action of the wind first deprives the finer bundles of their contained water, and then renders them impervious, thus inducing necrosis of the area they supply.—*M. H.*

Insectarium Notes. By W. W. Froggatt, F.L.S., Government Entomologist (*Agr. Gaz. N.S.W.* pp. 1019–1027; October 1903).—The notes are gathered from observations made upon insects kept in the breeding-cages of the insectarium erected in the grounds of the Hawkesbury College. The insectarium consists of a glass-house with benches running round the sides, containing a number of pot-plants and shrubs on which to feed plant-devouring pests received from all parts of the State. This opens into a well-lighted room containing the breeding-cages. The walls are covered with pictures of all the injurious and useful insects that have been figured in the 'Agricultural Gazette,' and the room is fitted with show-cases containing a series of typical insects of Australia, illustrating the different families and orders, and the correct classification and naming of the specimens displayed. The sorts noted are the Convolvulus Hawk Moth (*Protoparce convolvuli*), the Tibbed Case Moth (*Thyridopteryx Herrichii*), the Cotton-boll Moth (*Earias fabia*), the Painted Acacia Moth (*Teia anartoides*), the Forest Bag-web Moth (*Ocinara Lewinæ*), the Soy Bean Moth (*Gelechia simplicella*), the Underground Maize Beetle (*Pentadon australis*), the Orange Butterfly Parasite (*Pteromulus puparium*), the Leaf-mining Fly (*Phytomyza affinis*), the Snow Fly (*Aleurodes vaporium*), and the common Black Thrips (*Heliothrips Læmoridalis*). The article is illustrated with numerous engravings.—*H. G. C.*

Insecticide (*Rev. Hort.* July 1, 1903, p. 303).—M. Georges Bellair, in a report on the Horticultural Congress at Paris, states that Professor Gerard strongly recommends the following (Laurent's formula):

Rich tobacco juice	1 décilitre.
Soda crystals	20 grammes.
Black soap	100 grammes.
Wood spirit	1 décilitre.
Water	10 litres.

C. T. D.

Insecticide for Caterpillars on Plum and Vine. By J. Laborde (*Ann Agr.* p. 542 ; Oct. 1902).

Resin	1·5 kilo.
Caustic soda	0·2 „
Ammonia (22°B)	1 litre
Water	100 litres

The ammonia stupefies the insect, the resin varnishes over the respiratory organs and suffocates it.—*C. H. H.*

Insecticides and Fungicides. By Chas. D. Woods (*U.S.A. Exp. Stn. Maine, Rep.* 1902, pp. 197–209).—Contains analyses and results of experiments with certain commercial insecticides and fungicides, and notes that these can usually be compounded much more cheaply by the user.

F. J. C.

Insect Spray for Vegetables (*Qu. Agr. Journ.* xii. p. 347, May 1903).—Mr. S. C. Voller, Assistant Instructor in Fruit Culture of the Department of Agriculture, reports an infallible wash for destroying aphis and other insect life on vegetables.

Take 20 lbs. of resin, 4 lbs. of caustic soda (98 per cent.) or 6 lbs. (70 per cent.), 3 pints of fish oil, or $2\frac{1}{2}$ lbs. of whale oil soap, and 140 to 150 gallons of water. Place all the above ingredients in a boiler with 20 gallons of water, and let the whole simmer for three hours. Then add *hot* water slowly, and stir well till there are at least 40 gallons of solution, then add *cold* water to make up to 140 gallons. Never add cold water when cooking.—*M. C. C.*

Inula glandulosa fimbriata (*Gard. Mag.* No. 2603, p. 625; 19/9/03).—A new variety raised at Aldenham House, having the ray-florets fimbriated or divided and said to be more showy than the typical plant.—*W. G.*

Iris bucharica. By W. B. Hemsley (*Bot. Mag.* tab. 7914).—Nat. ord. *Irideæ*, tribe *Morœeæ*. Native of of Bokhara. This species is closely allied to *I. orchioides* and *I. caucasica*, having a nearly globose bulb. The flowers are yellow and white, about $2\frac{1}{2}$ inches across. The petals have long claws.—*G. H.*

Iris Disease. By C. van Hall (*Zeit. f. Pflanz.* xiii. pp. 129–144, 5 figs. ; 1903).—*Iris florentina* and *I. germanica* in Dutch nurseries have recently suffered considerably from a rot, which appears first in unfolding shoots, but later extends to the rhizomes. The author traces it to three bacteria. Of these *Bacillus omnivorus* has been studied in detail. A special investigation of toxins obtained is described. The author believes that many saprophytic bacteria may, under suitable conditions, become parasitic on plants.—*W. G. S.*

Irises, Dwarf. By S. Mottet (*Rev. Hort.* September 16, 1903, pp. 429–31 ; 3 woodcuts).—A description of a number of dwarf bulbous Irises, with cultural notes. Deep pots recommended, sandy peat, and frame culture owing to early blooming.—*C. T. D.*

Iris gracilipes. By W. B. Hemsley (*Bot. Mag.* tab. 7926.)—Nat. ord. *Iridaceæ*, tribe *Moræeæ*. Native of Japan. A tufted slender herb, 6–12 inches high. Flowers purple or lilac, 12 inches diam. Falls notched at tip, white in middle, striped with purple, and yellow-crested.—*G. H.*

Iris lupina. By J. G. Baker (*Bot. Mag.* tab. 7904).—Nat. ord. *Irideæ*, tribe *Moræeæ*. Native of Armenia. The outer segments of the perianth are 3 inches long, marked with copious lilac-brown veins on a yellowish-brown groundwork, having in the centre a large pilose spot of dark brown. The inner segments are larger, without the spot, and erect. *G. H.*

Isoloma erianthum. By W. B. Hemsley (*Bot. Mag.* tab. 7907).—Nat. ord. *Gesneraceæ*, tribe *Gesnereæ*. Native of Colombia. This is a robust herb, 2–4 feet high, with crimson scaly rhizomes and sub-fleshy leaves. Flowers are $1\frac{1}{2}$ inch long, velvety, orange-red.—*G. H.*

Itea ilicifolia. By W. W. (*Gard. Chron.* No. 883, p. 375, fig. 152; Nov. 26, 1903).—This genus until quite recently, when this species was introduced by Messrs. Veitch & Sons from China, was only represented in this country by *I. virginica*. *I. ilicifolia* was originally discovered by Dr. Henry in 1886 in Ichang, where it grows in rocky places, forming a shrub from three to four feet in height. It forms a shapely evergreen bush, with holly-like leaves, and spikes, four inches long, of white flowers. It will probably be found to be hardy in the South-west of England. *G. S. S.*

Ivy-clad Trees (*Journ. Hort.* June 25, 1903, p. 557).—A writer from Ireland approves of the destruction of Ivy on roadside trees—(1) because it makes them more liable to blow down, (2) because it spoils the timber. Still there are many who think more of the æsthetic than the commercial point of view, and would prefer to keep the Ivy.—*C. W. D.*

Ixiolirions. By S. Arnott (*Gard. Mag.* No. 2610, p. 738; 7/11/03).—A review of this small genus of bulbous plants, all beautiful and easily cultivated. All the species appear to thrive well as far north as Dumfries. *W. G.*

Java, Flora of, by L. A. Deschamps. By J. Britten (*Journ. Bot.* 488, pp. 282–3; 8/1903).—Bibliographical note on a MS. Flora and drawings, made between 1791 and 1802, and preserved in the library attached to the National Herbarium.—*G. S. B.*

Jungermanniales, The Oil-bodies of. By A. J. M. Garjeanne (*Flora*, vol. xcii., 1903, pp. 457–482; 18 cuts).—The oil-bodies arise in the vacuoles: the final contents appearing to be one, or few, or many, oil-drops suspended in a small quantity of viscid liquid containing proteids. The oil is a fat oil, difficult of saponification, and, like castor oil, soluble in strong alcohol. The oil-bodies lie in the cytoplasm, and have a proper wall ("tonoplast") like other vacuoles. The oil-drop may show to-and-fro motions within the body, which have the character of a Brownian dance when they are minute and numerous. Budding and

partial fusion of oil-bodies are observed and figured. Their number increases where secondary meristem is formed. Of their significance the author has no clue, experimental variation of the conditions of culture making no obvious difference.—*M. H.*

Kapok, or Silk Cotton (*Eriodendron anfractuosum*). (*Qu. Agr. Journ.* xiii. p. 351, Oct. 1903).—This soft material, which is well known as largely used in the upholstering trade for stuffing mattresses, pillows, &c., as a substitute for feathers, is the product of a kind of cotton tree, *Bombax pentandrum* or *Eriodendron anfractuosum*, much grown in Java of late years for the sake of the fruits which produce the fibre, which meets with a ready sale in European markets. The tree grows rapidly, and begins to bear from the second year. It requires no attention, and grows on very poor soils, and is not exacting as regards water. In 1896 the exportation from Java rose from 1,888,639 kilos. to 2,777,467 kilos. In 1898 the quotations were nominally 9*d.* to 10*d.* per lb. in Holland. The seeds furnish an oil as a by-product. This is one of the products which has been suggested for introduction into the Australasian colonies.—*M. C. C.*

Kermès or Scarlet Mildew in Uruguay (*Le Jard.* October 20, 1903, p. 318).—A patent has been taken at Montevideo for a remedy called "Frutolin," said to be quite efficacious against a scarlet scale on fruit trees called "kermès." It is stated that a large Government order has been given from Germany.—*C. W. D.*

Kumquats, The. By H. Harold Hume (*U.S.A. Exp. Stn. Florida, Bull.* 65, December 1902; illustrated).—The Kumquat was not known in Europe until introduced from China by Robert Fortune in 1846.

Shortly after, it was taken to America. The correct Latin name is *Citrus japonica*, as described by Thunberg in 1784, and its generally accepted common name throughout the U.S.A. and India is Kumquat, from the Chinese, meaning "Gold Orange."

In Japan and China, where it is extensively cultivated, it is called Kin Kan.

As a budded tree it reaches a height of 8 to 12 feet, and bears on one-year-old wood.

There are two varieties: *Nagami*, oblong, olive-shaped, and *Marumi*, round. Of the two varieties Nagami is generally considered the more desirable. Both have, when eaten raw, a very pleasant flavour. The juice is acid, the rind has an agreeable spicy taste, and the inner portion of the rind is decidedly sweet.

Seedling Kumquats do not bear so well as those budded upon strong stocks, of which *Citrus trifoliata*, Sour Orange, Pomelo, and Rough Lemon are recommended for different parts of Florida.

It is hardier than most Citrus fruits, but requires protection in the shape of banking in Northern Florida from December to March.

It can be planted in hedge form 5 ft. apart, and the rows 12 ft. apart, or in ordinary rows 8 ft. by 12. In pots the Kumquat surpasses all other Citrus fruits as a useful ornamental plant. For this purpose it should be budded on *Citrus trifoliata*.

Mealy bug (*Dactylopius citri*), which is its worst enemy, must be kept in check with tobacco juice, or strong syringing with clear water.

It must not be allowed to become pot-bound, and requires plenty of water.

The best package for the Kumquat is the Strawberry carrier, holding about a quart. Much may be done to create a demand by attractive packing, such as putting up the fruits with leaves attached, when they make pretty ornaments for the table.

The fruit may be eaten raw, without removing the skin, and it also makes an excellent preserve.—*C. H. C.*

Laburnum caramanicum. By Sir J. D. Hooker (*Bot. Mag.* tab. 7898).—Nat. ord. *Leguminosæ*, tribe *Genisteæ*. Native of Greece and Asia Minor. A small tree with shortly pedunculated racemes of golden-yellow flowers. The pod has the upper margins narrowly winged, and seeds one-fifth an inch in length.—*G. H.*

Lælio-Cattleya Wiganiæ (*Orch. Rev.* Aug. 1903, p. 233, fig. 39).—Some remarks from Captain Hurst accompany the illustration of this secondary hybrid, derived from the intercrossing of *Cattleya Mossiæ* and *Lælio-Cattleya Gottoiana.*—*H. J. C.*

Leaf-cuttings, Regenerative Root and Bud Formation from Leaves, and its use in the Propagation of Plants.—By H. Lindemuth (*Gartenflora*, 15/9/03, p. 479, and 1/12/03, p. 619).—The rapid propagation of plants may be carried on by means of (1) cuttings from shoots of actively growing plants, (2) cuttings from resting trees and shrubs, and (3) leaf-cuttings. The author describes his investigations concerning the last.

The leaves were broken off the stem and the buds in the axils were cut off with a short portion of the petiole. The leaves were then stuck into a pot of soil only so far as was necessary to obtain a firm hold for the petiole; the length varied with the size of the leaf, and was usually between two and five cm. Sessile leaves necessarily had a small portion of the leaf-blade buried.

In the first series of experiments, 28 out of 41 species tried produced roots and buds, or roots only; 13 species failed. These failures do not necessarily indicate that such plants cannot be propagated in this way, as the author found later. In some cases only one leaf out of several in the same pot formed roots.

The formation of roots and buds on leaf-cuttings is influenced by many things: for example, by length of the leaf-petiole; the distance of the leaf-blade from the soil; the presence or absence of wounds; depth of the petiole and blade in the soil; and by dampness of soil and air. The author generally found that the plants obtained from leaf-cuttings were stronger, more vigorous, and more lasting than those produced from ordinary cuttings.

New or rare plants which do not produce many shoots may be quickly increased by leaf-cuttings. The process is of especial use for the rapid propagation of new annuals, many of which are able to form roots and buds on detached leaves treated in the manner indicated.

In the second communication Herr Lindemuth gives a further list of 37 species, whose leaves he has found capable of producing roots, and some of them have already given rise to buds and shoots.

Much remains to be discovered in regard to the dependence of the process on the age of the leaf, its position on the stem from which it is derived, and the time of year. In some cases the author found that leaves could root readily at one time and not at another a few weeks later. Frequently roots only can be produced without signs of bud formation, and the bud produced may be either a flower-bud or a leaf-bud, according to the position the leaf occupies on the plant from which it is taken.

J. P.

Leaf-spots on Linden and Elm Trees (*U.S.A. Exp. Stn. Hatch, Mass., Ann. Rep.* 1903, p. 35).—These fungi seem to thrive chiefly upon older trees and trees in poor condition. This is particularly noticeable with the leaf-spot which attacks Lindens (*Cercospora microsora*), and this fungus is worse in its effects than the Elm leaf-spot (*Dothidella ulmea*). Spraying is recommended twice in the summer, and it is estimated that sprayed trees gain two to five per cent. in growth and development. The leaves will also remain green longer, and not drop so soon as on unsprayed trees.—*V. J. M.*

Leaves with the Function of Support. By F. W. Neger (*Flora*, vol. xcii., 1903, pp. 380–395; 2 cuts).—The down-turned lower leaves of *Geranium Robertianum* help its support when growing on a vertical surface; after the blade fades the petiole long remains fresh and acts as a stay. On removing these so that the stem bent down, after two or three days, the leaves at the next node curved down as supports, while the stem above turned up at a right angle. Thus the mechanism is one of correlation in relation to "morphæsthesia." Leaves of similar function occur in *G. lucidum* and *Stellaria nemorum*.—*M. H.*

Leguminosæ Tubercles. By R. Stormer (*Nat. Zeit. Land-Forst.* i. pp. 130–146, with 3 figs.; 1903).—A review, by an active investigator, on our present knowledge regarding the root-tubercles of *Leguminosæ*. A brief summary of earlier work leads up to the subject of "Nitragin," those pure cultures of the bacterial organisms, which a few years ago were so much spoken about. Up to the present "Nitragin" has not fulfilled all that was expected of it in improving the yield of leguminous crops. The main part of this paper is a review of the causes of failure, and of recent investigations on how this is to be prevented. Two things of prime importance are the strength or virulence of the tubercle-organisms, and the method of infecting crops with the pure cultures. If the organism is too virulent the leguminous host suffers; if not virulent enough, then the host-plant dominates. In either case the tubercles are not fully developed, and the crop does not benefit. A good deal has been learnt recently about the degree of virulence needed to secure infection. "Nitragin" failures were chiefly due to the method of application (viz. either mixed with water and sprayed on to the land, or mixed with earth and strewn on the surface). The result was that the organisms failed to reach the roots of the crop. Recent experiments in infecting the seed before sowing have

given good results, and in future this will probably be the best method for use on the farms. The three figures show the effects of successful infection of 'Serradella' (*Ornithopus sativus*) compared with non-infected plants.
W. G. S.

Lilies. By G. B. Mallett (*Gard.* p. 333, 14/11/03; p. 354, 21/11/03; p. 426, 19/12/03).—A series giving full descriptions of all the species and hybrids, together with notes upon the culture and use of each. Those treated of in the above numbers are from *L. Bakerianum* to *L. chalcedonicum*, both inclusive.—*E. T. C.*

Lilies, New, in 1903 (*Gard. Mag.* No. 2613, p. 793; 28/11/03). —Interesting notes upon the new and rare Lilies, showing which succeeded best during the last year in the open air, the season being the wettest on record and the worst possible for Lily culture out of doors.—*W. G.*

Lilium longiflorum, Propagation from Seed. By G. W. Oliver (*U.S.A. Dep. Agr. Bur. Pl. Ind., Bull.* 39, June 1903; 7 plates). This method is declared to save one to two years in producing marketable bulbs of *L. longiflorum* and its variety *Harrisii*, as compared with the scale method, and that it is possible thereby to raise plants within a year from seed flowering in pots and ready for sale. The variety known as *giganteum* or *eximium giganteum* is regarded as the best.

By careful selection to obtain healthy parents, remarkable progress in vigour has been obtained, *Harrisii* × *longiflorum* is the cross that produces the longest flowers. Detailed instructions for pollination, ripening, sowing, &c., are given.—*E. A. B.*

Lily, Easter, propagation from seed. By G. W. Oliver (*U.S.A. Dep. Agr. Bur. Pl. Ind., Bull.* 39, 6/1903; 7 plates).—The enormous extent to which this Lily (*L. Harrisii*) is grown is commented upon, and the deterioration in the Bermuda and Japan grown lilies mentioned. This deterioration is, according to the author, due to too great anxiety on the part of the growers to raise large numbers on small areas, and to the fact that selection is not practised. He advocates the home raising of Lilies from seed, claiming that plants so raised have increased vigour, come into bloom one or two years earlier than those raised from bulb-scales, and give an opportunity of raising new races which may be fixed.

Crosses have been effected between *L. longiflorum* and *L. Harrisii*, the resulting seedlings being remarkable for the bearing of flowers a comparatively short time after germinating, many within the first year, the bulbs attaining a circumference of six inches. The plants were grown on under glass without a check.—*F. J. C.*

Lime, Sulphur, and Salt Wash. By C. L. Marlatt (*U.S.A. Dep. Agr., Div. of Entom., Cir.* 52, 2nd series; 2/1903).—This wash has under certain conditions proved very effective against San José Scale in the Eastern States. The formula recommended is lime (quick) 30 lbs., sulphur 20 lbs., salt 15 lbs., water 60 gallons. In making 50 gallons or over, the mixture should be boiled three to five hours, and thoroughly stirred, especially at first. It may be prepared in an iron vat, but is best boiled in

hogsheads or barrels with steam. It should be strained through an iron strainer and applied to the trees as hot as possible. Certain precautions are to be observed, (1) It is a winter wash (February or March best season) and for deciduous trees only. (2) It is destructive to pumps and nozzles, but this may be minimised by thorough washing with water after use. (3) Clothing is ruined, and care should be taken of the eyes. Its great advantage over other winter washes lies in its inexpensiveness, the materials costing only 1 cent ($\frac{1}{2}d.$) per gallon, and in California the wash is furnished and put on the trees for 5 cents ($2\frac{1}{2}d.$) per gallon.—*F. J. C.*

Lime upon Plant Growth, Influence of. By H. J. Wheeler and G. E. Adams (*U.S.A. Exp. Stn. Rhode I., Bull.* 96; Aug. 1903; 4 figs.).—Experiments were carried out with various crops to ascertain the influence upon them of lime in connection with nitrate of soda and sulphate of ammonia. Lima Beans, Raspberry (Ohio Blackcap), and Cranberries were injured by the addition of lime. Poppy, *Zinnia*, Pumpkin, Squash (White Bush Scalloped), Currants, Asparagus, Pansy, and Rhubarb were all improved by the addition of lime in connection with nitrate of soda, while Grape ('Concord'), Blackberry, and Raspberry ('Cuthbert') gave the best results when sulphate of ammonia was used with the lime. Tables are given showing the increase in the diameter of trees when lime was used in connection with sulphate of ammonia and nitrate of soda and when they were used alone.—*F. J. C.*

Lissochilus purpuratus. By W. B. Hemsley (*Bot. Mag.* tab. 7921).—Nat. ord. *Orchideæ*, tribe *Vandeæ*. Native of Tropical Africa. This is a terrestrial tuberous herb; the tubers are "similar to those of a Kidney Potato, produced in chains nearly a yard long." Sepals and petals rose-pink. Labellum 3-lobed, purple crested with longitudinal darker purple edges.—*G. H.*

Lobelia rosulata. By Spencer Moore (*Journ. Bot.* 492, p. 402; 12 1903).—Description of a new annual blue-flowered species allied to *L. benguellensis*, collected in damp ground near Johannesburg by Dr. Rand.—*G. S. B.*

Logan Berry (*Journ. Hort.* October 8, 1903, p. 328).—A life-size portrait of this, said to be a favourite fruit of the near future. It is cultivated like the Raspberry, but the fruit is larger and ripens earlier.

C. W. D.

Lumbering at Sewanee, Tennessee, Conservative. By John Foley (*U.S.A. Dep. Agr. Bur. Forestry, Bull.* 39).—The necessity for strict supervision of felling and clearing timber has, unfortunately, until lately received only a small share of attention, the result being that indiscriminate cutting and a great waste of timber have been brought about. Now, however, matters are entirely different, for, with the rapid decrease in area of woodlands, the strictest conservation has been found necessary, not only in America, but every part of the world from which timber has been exported. In the present book much valuable information as to the plans adopted in the entire remodelling of an injurious

and wasteful system into a systematic and profitable method of treating the woodlands is clearly set forth, the beautifully executed illustrations going far to elucidate the text.

The Sewanee forests cover an extent of about 5,500 acres, at altitudes varying from 800 to nearly 2,000 feet.

The Black Walnut, Juniper, Bitternut, Hornbeam, and Tulip Tree, particularly the last, are the principal timber-producing species.

A. D. W.

Lysimachia crispidens. By W. B. Hemsley (*Bot. Mag.* tab. 7919).—Nat. ord. *Primulaceæ*, tribe *Lysimachieæ*. Native of Central China. Of the 120 species of this genus China has half of them. This is a perennial herb, with numerous slender scapes with racemes of pink flowers $\frac{1}{2}$–$\frac{3}{4}$ inch diam.—*G. H.*

Lysimachia crispidens. By W. Irving (*Gard.* p. 389; 6/6/03).—Although some doubt exists as to its complete hardiness, this plant has already proved to be of great value in the cold greenhouse. It is quite new to cultivation, having been comparatively recently collected in the neighbourhood of Ichang, province of Hupeh, China. So far as we know it has only bloomed with Messrs. Veitch and at Kew. It forms a rosette of somewhat fleshy leaves not more than nine inches high, and bears a profusion of pinkish flowers upon very slender pedicels.—*E. T. C.*

Madeira and the Canary Islands, Botanical Journeys in. By J. Bornmüller (*Engl. Bot. Jahrb.* xxxiii. 1903, pp. 387–492; 8/12/1903).—A systematic account of the flowering plants and Ferns collected by the author during two journeys through the islands, with notes on the distribution of the species and forms, and critical remarks.—*A. B. R.*

Magnesium Salts: Under what circumstances are they injurious? By Oskar Loew (*Flora*, xcii. vol. 1903, pp. 489–494).—Despite the part played by magnesium compounds in the metabolism of plants, in the absence of calcium compounds they may act as poisons. Thus *Spirogyra* dies rapidly in 0·1 per cent $MgNO_3$ but lives for weeks if in addition 0·3 per cent. Ca $2NO_3$ be supplied. The author's interpretation is that Ca forms important combinations with proteids in nucleus and chloroplasts. If Mg replace it the osmotic capacity is altered, and fatal changes of structure are the result. If enough Ca compounds be present to enter into the proteid combination, the Mg is excluded by the law of mass-action, and the Mg is free to perform its normal part in metabolism. Consequently for optimum results a definite Mg : Ca ratio must be available for absorption.—*M. H.*

Mango in Porto Rico. By G. N. Collins (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 28; 15 plates).—An exhaustive account of the introduction, culture, uses, present status, packing, &c., of the Mango. Nine Porto Rican forms are described and figured, and the desirability of introducing seven others, and the best method of so doing discussed.

E. A. B.

Mangrove Seedlings, Note on the Dispersal of. By Cyril Crossland (*Ann. Bot.* vol. xvii. No. lxv. p. 267; January 1903. With figure in text).—This is an interesting record of one of the remarkable ways in which planting is sometimes done by nature. In this case we have the planting of a developed embryo minus the cotyledons, which remain behind in the fruit. The seed of Mangrove (*Rhizophora*) germinates in the fruit, the hypocotyl protrudes, attains a length of about a foot or eighteen inches towards earth, and finally, by its weight, causes the embryo to fall like a shaft straight into water or mud. If in mud, the embryo is thus planted upright and is ready to grow. This is the well-known method of planting, but there is another newly observed and the subject of this note. It depends upon ripples of water and falling tide. "The coasts of the whole of British and German East Africa are composed of hard coral limestone of peculiar properties. . . . The erosion of the waves has cut down this rock so that at low tide there is an almost plane surface of rock, sloping gradually from the base of the cliffs to low-water level. In creeks and sheltered places generally, near high-water mark, this rock plane is full of irregular small holes and crannies, but no loose stones or deposits, other than a very thin coating of fine mud, interrupt its uniformity.

"On this hard surface, sending their roots into the crannies, the greater number of the Mangroves of Zanzibar flourish so well that a considerable trade is carried on from Chuaka Bay in their stems. (These are used in the building of all the Arab and native houses of Zanzibar, being too hard for the jaws of the termites.) Only occasionally do we find Mangroves growing in mud and see the demonstration of the well-known method of planting, viz. by the impact of its fall forcing the root of the embryo into the mud. In the majority of cases one finds the embryo placed in one of the holes of the rock, which is usually of but slightly larger diameter than itself. Obviously it did not fall by chance into this position; suitable holes are not so numerous, and the insertion of the radicle into them not so easy as this would imply. Moreover, I have often observed embryos neatly planted in these holes at a distance of more than a hundred yards from the shade of the nearest possible parent tree, and in a few cases at a distance of miles.

"How this planting could be done, except by human hands, remained for a long time a mystery to me. The solution came when I noticed the frequency with which I met embryos floating in the sea, being carried out of the bay by the strong tidal currents. Often I passed through fleets of them, as it were, all floating in the same peculiar way, viz. vertically, with the leaf-bud just projecting from the water. A consideration of the shape of the radicle shows that not only is there a perfect adjustment of the specific gravity of the whole to that of sea-water, but a peculiar distribution of it in order that the thick end may sink instead of floating uppermost, as it would if the specific gravity were the same throughout. Both kinds of embryo, the thick and the slender, float in the same way. On reaching the shore the embryos are planted by the insinuation of the root-tip into any softness or crevice of the bottom by the falling tide."—*R. I. L.*

Manures: The Relative Value of Nitrogen, Muriate, &c. (*U.S.A. Exp. Stn. Hatch, Mass., Ann. Rep.* 1903, pp. 107 to 153; tabs.).

—Valuable results of experiments are here given. Several fields were used, and each field cut up into plots; for instance, in the field set apart for experiments with nitrogen, three plots had no nitrogen of any sort, while others had respectively barnyard manure, nitrate of soda, sulphate of ammonia, and dried blood, the crops sown being Oats, Rye, Soy Beans, Clover, and Potatos. From certain experiments, nitrate of soda showed the best results, equal to 100 per cent., and dried blood the poorest, equal to 87·7 per cent., but even this was far in front of the plots without any nitrogen, which were only equal to 71·0 per cent. Many tables are given, with the exact results of the experiments, and must amply repay consideration.

Legumes as nitrogen gatherers, and high-grade sulphate of potash, are treated of at length, and also elaborate experiments in *soil tests*. All the results go to show the immense benefit to be derived from manures, and the reader soon discovers the best manure or combination of manures for any particular crop.—*V. J. M.*

Manurial Experiments and their Value. By U. Baumann (*Nat. Zeit. Land-Forst.* i. pp. 33–41, 110–119, 473–478; 1903).—The first part of a critical review on the possibilities of being misled by manurial experiments. The author, an experienced member of the Bavarian Government Agricultural Department, puts on record some startling facts, which cannot well be condensed into an abstract. The methods of manurial experiments may be classed: (1) Pot or box experiments; (2) Field-plots; (3) the so-called statistical or summary method.

(1) *Pot-experiments.*—These include the use of flower-pots and zinc or wood boxes with or without bottoms. The boxes are either sunk in the earth or not. Advantages: small space occupied; the ease with which uniform soil may be used, and manurial constituents added in exact quantities; a uniform water-supply, temperature, and other conditions are ensured. Objections: (*a*) While the open land subjected to alternations of heat and cold, wet and dry, is favourably situated for the circulation of gases (*e.g.* oxygen and carbonic acid), no pot or box (even without a bottom) allows free circulation. Thus, some pot experiments, in direct opposition to general experience, show that farmyard manure is injurious, and bone-meals and many phosphates are useless manures. (*b*) The small size of the box gives a false return as to the crop; the difference between two experiments can never be great, and an insect damaging a few plants may utterly spoil a result; in favourable cases pot-crops may far exceed in weight anything ever approached in field experience. The general result is that pot manurial experiments are absolutely worthless as guides to what will happen in the field.

(2) *Field-plots.*—These are carried out on plots of ordinary field land. The method is free from the objections to pot-cultures. It has been proved that small plots (say one fortieth of an acre) give much the same results as plots of an acre each. Two conditions must, however, be fulfilled. Firstly, parallel plots should be used, at least three for each manure under experiment. Secondly, the soil must be as nearly as possible uniform in physical and chemical properties in *all* the plots. This last is determined by taking numerous borings, and by a careful

analysis of some of the borings. This is rarely done, hence hundreds of field-plot experiments are useless. The author advises rejection of all experiments in which soil investigations have not been made, and in which parallel plots are not used.

(3) *Statistical Method.*—By this is meant the averaging of as many field-plot experiments as possible, carried out on one plan, in as many localities as possible. The method includes three distinct phases: (*a*) A specialist prepares an experimental plan and instructions; (*b*) the farmers in different localities provide the ground, apply manures, and grow the crop; (*c*) the specialist gathers the crop-returns together, and reckons the average value of each manure used. The method can only be successful if each part is thoroughly carried out. The farmer's part is very liable to error, for many reasons, but one would expect that the specialist would be reliable. Dr. Baumann, however, shows that even here there is much to be desired. To show the line of criticism we take one case—a plan prepared in the Agricultural Polytechnic at Berlin. The experiments are intended to compare the value of three phosphate manures: superphosphate (phosphate and sulphate of calcium), Thomas phosphate (phosphate and hydrate of calcium), and Algerian phosphate (phosphate and carbonate of calcium). It will be seen that the accompanying salt of calcium varies in each case, yet the plan of experiments takes no account of this. From the results obtained it is impossible to see whether the phosphoric acid or the calcium salt was the chief agent. The plan was taken up by several farmers, but in no case was an examination of the soil made. The result was that with each of these phosphates the harvest was better in half the cases than the unmanured plot, but in about half the yield was worse. And here comes in the "statistical method." By estimating the average of the harvest results in different ways, one may demonstrate one of three consequences: (*a*) phosphate manures repay many times over their original cost; (*b*) they just repay their cost; (*c*) they give worse results than if they had not been used. Statistics are here (the author remarks) the greatest liars in existence. Evidently much remains before this method is perfected, not only in Germany, but also in Britain. The author proposes to show how improvement can be effected in a future series of papers.—*W. G. S.*

Marshall Islands, The Flora of the. By G. Volkens (*Not. König. Bot. Berlin, Bd. IV.*, pp. 83–91; August 30, 1903).—A list of Schnee's, Finsch's, and Jensen's plants of this relatively poor flora.—*H. M. W.*

Masdevallia Laucheana. By R. A. Rolfe (*Orch. Rev.* Nov. 1903, p. 347).—Historical and descriptive particulars of this pretty small-flowering *Masdevallia* are given.—*H. J. C.*

Maxillaria funerea. By R. A. R. (*Orch. Rev.* Aug. 1903, p. 232).—Descriptive particulars of this species are here given from a plant that had recently flowered in the Royal Botanic Gardens, Glasnevin.—*H. J. C.*

Maxillaria gracilis. By R. A. R. (*Orch. Rev.* Aug. 1903, p. 230).—Descriptive particulars of this Brazilian species.—*H. J. C.*

Meliaceæ, Two New. By J. Perkins (*Not. König. Bot. Berlin, Bd. IV.*, pp. 78–79 ; August 30, 1903).—Descriptions of *Aglaia Harmsiana* Perk. and *Cipadessa Warburgii* Perk., from the Philippine Islands, in Warburg's collection.—*H. M. W.*

Melocactus. By Dr. J. Valckenier-Suringar (*Rev. Hort.* July 1, 1903, pp. 310–311 ; 1 woodcut).—This genus, usually very difficult to raise from seed and of very slow development in any case, is greatly helped by plunging the pots containing the seedlings and affording plenty of bottom heat. The woodcut shows a plant of *M. Salmianus* var. *contractus*, sown in the spring of 1901, and forming a typical plant over $2\frac{1}{2}$ inches diameter in October 1902.—*C. T. D.*

Melon : A new Preserving Variety (*Agr. Gaz. N.S.W.* p. 587, July 1903).—This Melon was grown at the Bathurst Experiment Farm from seed received from Mr. T. C. Sutton, Triamble. It differs very considerably from those ordinarily cultivated, and has proved itself exceptionally prolific, yielding a considerably greater weight than any other cultivated. It is an excellent preserver, making a high-class jam. The solidity of these Melons is remarkable, three fruits weighing $56\frac{1}{4}$, $47\frac{1}{4}$, and 42 lbs. It is considered a hybrid between the Rio Pumpkin and the common preserving Melon. It came up a chance plant in a paddock where preserving Melons and Pumpkins had been sown together. No Melon was ever before on the place resembling it. They are exceedingly hardy, and stand dry weather apparently well. It is undeniably a very fine Melon and a horticultural acquisition. No other Melon resembles it, and it can be fairly claimed as a new variety. It is named ' The Triamble.'

H. G. C.

Meryta Denhami, ♀. By W. B. Hemsley (*Bot. Mag.* tab. 7927).—Nat. ord. *Araliaceæ*. Native of New Caledonia and New Hebrides. A small diœcious tree, attaining a height of 30 feet. Leaves coriaceous, variable in shape and size. Flowers capitate, in panicles 2–3 feet long, densely crowded, yellow-green. Whorls varying from 5 to 12 parts, usually 10.—*G. H.*

Mesembryanthemums, The. By Ch. Simon (*Rev. Hort.* Nov. 16, 1903, pp. 524–9 ; coloured plate and 14 woodcuts).—A very interesting article on these plants, with cultural directions, and description of choice species recommended for culture and easy to obtain, and also rare ones. Of the former there are cited *M. aureum, barbatum, b. pallescens, capitatum, coccineum, Cooperi, cordifolium, c. variegatum, crystallinum, echinatum, fulgens, grandiflorum, lacerum, lupinum polyanthum, pomeridianum, retroflexum, roseum, rubricaule, splendens, s. album, tigrinum* and *tricolor*. All grown in the open in the summer ; wintered in cold, well-lighted house.—*C. T. D.*

Mildew of Cucumber, False : Peronosporeæ, Contributions to the Study of. By S. J. Rostowszew (*Flora*, vol. xcii. 1903, p. 405–430 ; 1 photo, and tabs. xi., xii., xiii.).—This mould, first described from American sources as *Peronospora* or *Plasmopara cubensis*, occurred on the Gherkin

in the Government of Tver (Russia). It infests the leaves, producing grey-brown spots, with a violet film of mould. The conidiophores may pierce the cuticle, but mostly protrude through the stomata; they are "bulbous" (rather swollen into an elongated spindle) at the base, and branch freely. Each conidium is attached by a little sterigma, whose substance becomes ultimately soluble in water (callose ?). Such sterigmata the author found in every species of the order which he examined; they develop by the constriction and solidification of the conidiferous hypha immediately below the attachment.—*M. H.*

Millipedes and Centipedes (*Journ. Hort.* November 5, 1903, p. 424).—Life-size figures are given. Millipedes of the genus *Julus* are hurtful. Centipedes of the *Geophilus* tribe are beneficial, feeding chiefly on worms and slugs.—*C. W. D.*

Mimosa Spegazzinii. By Sir J. D. Hooker (*Bot. Mag.* tab. 7899).—Nat. ord. *Leguminosæ*, tribe *Eumimoseæ*. Native of Argentina. It is nearly allied to, and equally sensitive as, *M. pudica*. It is a scandent bush, armed with recurved spines. Leaves have two pinnæ, each with numerous pinnules, margins having long bristles. Heads $1\frac{1}{4}$ inch in diameter, rose-purple filaments.—*G. H.*

Mint, Its World Cultivation (*Le Jard.* December 5, 1903, p. 365).—In France the headquarters of the cultivation of Mints is near Sens, where 80,000 lb. of oil is annually produced. In Germany it is produced chiefly near Leipzig. Essential oil of Mint is also exported from China and Japan. Several places in England are mentioned where Mint is cultivated, but the finest quality in the world is that grown at Mitcham in Surrey.—*C. W. D.*

Mite-galls, Two "native." By E. Küster (*Flora*, vol. xcii., 1893, pp. 380-395; 4 cuts).—*Eriophyes diversipunctatus* and *E. fraxinicola* produce æcidia on the Aspen and Ash respectively. Th former inhabits the concave glands at the insertion of the leaf on the petiole, inducing hypertrophy, the cavity deepening, and upgrowths from its base becoming adnate finally make it labyrinthine. The Ash-gall is on the leaf-blade, a typical "pouch-gall" due to a concave upgrowth of the leaf, and the walling over of the entrance to the cavity by ingrowths below; as in the Aspen-gall, adnation takes place between the growths, and the cavity is chambered. An exception among mite-galls is that in both cases the cavity is quite glabrous, which the author relates to the adnation of the ingrowths. Histological details are given; and the stimuli that are functional in the production of galls are discussed.—*M. H.*

Mitosis of the Primary Nucleus in *Synchytrium decipiens*. By F. L. Stevens and A. C. Stevens (*Bot. Gaz.* vol. xxxv. No. 6, p. 405, plates xvi., xvii.).—This fungus is a parasite invading the cells of *Falcata comosa*, and ultimately fills the cell by absorbing the protoplasm and nucleus. The nucleus of this unicellular fungus-parasite exceeds in size any one of ordinary flowering plants as 35 : 20—30. The division of this primary nucleus is the first step to the formation of swarm spores.

The host-cell normally averages 15 μ in diameter. After the occupation by the parasite it usually attains a diameter of 100 μ or more. The authors then describe the vacuolisation of the nucleolus, the distribution of chromatin in clots and droplets on the surface of the nuclear membrane, in preparation for mitosis, when the membrane becomes gelatinous, the chromatin assumes the spirem form, and the nucleolus disappears. The chromatin undergoes remarkable changes. Formerly lumpy, it becomes changed into more numerous and small masses, then elongate into rods in an entangled manner. This is the spirem stage. The spirem threads become thickened, apparently by longitudinal fusion of separate rods, while the size of the nucleus decreases.

A spindle now forms in the centre by the threads of the spirem group forming themselves into the spindle.

No centrosomes or polar radiations were distinguished in any stages of the mitosis.

The whole chromatin content has all along been decreasing largely.

The nuclear membrane, after gelatinising, forms a broad zone of granular matter, in the centre of which, within a clear space, the spindle lies.

The chromosomes appear to be four in number at each end. The spindle fibres fall together in the centre and divide, giving rise to the independent daughter nuclei.—*G. H.*

Mole Cricket in Porto Rico. By O. W. Barrett (*Bull. Bot. Dep. Trin.* 39, p. 573).—Gives the best methods for combating this insect pest, which is terribly destructive to crops of Tobacco, Cane, and small crops.—*E. A. B.*

Moles, A Plea for (*Journ. Hort.* August 20, 1903, p. 167).—It is said that the mole, being insectivorous, is one of the farmer's best friends. Also that he assists in dressing the surface with new soil, and draining it by his tunnels. This is true enough, but those who have had experience of moles in gardens, and especially on rockeries, will be willing to forego these advantages.—*C. W. D.*

Monocotyledons, A Theory of the Origin of. Founded on the structure of their seedlings. By Ethel Sargent (*Ann. Bot.* vol. xvii. No. lxv. pp. 1–89, Jan. 1903 ; plates i.-vii. ; ten figures in the text).—This paper is the record of a very important and well carried-out investigation, the direction of which has received but little attention. Its object has been to throw light, if possible, on the relationship between Monocotyledons and Dicotyledons. The index of species mentioned contains 159 names ; 12 species are illustrated by the 60 figures in the plates, all, with one exception, drawn by Miss Agnes Robertson. A generation ago the Monocotyledons were regarded as probably the older group, but botanists have never been unanimous in this opinion, and of late the evidence of fossil botany has, on the whole, inclined the scale in the opposite direction. The case is so admirably summed up by Professor Bailey Balfour (in the article on Angiosperms, Supplement to the 'Encyclopædia Britannica,' vol. xxv. 1902), that I am tempted to quote his judgment in full :

". . . . . But there is no sound basis for the assumption that the Dicotyledons are derived from Monocotyledons; indeed the palæontological evidence seems to point to the Dicotyledons being the older. This, however, does not entitle us to assume the origin of Monocotyledons from the Dicotyledons, though there is manifestly a temptation to connect the bilobic forms of the former with the ranal ones of the latter."

Miss Sargent believes that the single cotyledon of Monocotyledons was derived from both the cotyledons of a remote ancestor, and strong evidence in favour of this view is given by her paper.

In an abstract there is danger of interference with the proportions of an argument, but it must be mentioned that a table is given of "Dicotyledonous seedlings with a well-marked cotyledonary tube" (familiar in *Delphinium* and *Anemone*), and another of "Pseudo-monocotyledons," a familiar example of which we have in *Cyclamen*. An interesting part of the paper is that on the origin of the Monocotyledonous habit. "Comparison of the species mentioned in Table I. (the first above quoted) with each other shows that they have another character in common besides that of a cotyledonary tube. With one exception their hypocotyl is always much reduced in length and is commonly thickened . . . The great majority of the species mentioned are tuberous; and others (*Podophyllum, Serratula, Polygonum, Rheum*) form an upright, much shortened, subterranean axis in which the first internodes of the stem, as well as the hypocotyl, are suppressed. The species of *Anemone* and *Oxalis* with united cotyledons are distinguished from their neighbours within those genera by their tuberous habit . . . Darwin, speaking of several pseudo-monocotyledons, together with some other species in which both cotyledons are very much reduced in size, or absent altogether, says: 'From the several cases now given, which refer to widely different plants, we may infer that there is some close connection between the reduced size of one or both cotyledons and the formation by the enlargement of the hypocotyl or of the radicle of a so-called bulb.' He attributes this to correlation of growth: the expenditure of material in the formation of a bulb or tuber is balanced by the economy affected in the reduction of cotyledonary tissue . . . Concrescent cotyledons seem to be an adaptation for producing effective assimilating surfaces with the least possible expenditure of material. The production of a single cotyledon, whether by the more complete fusion of two or in any other way, is also an economy as compared with the formation of two cotyledons. It is true that in time the extra assimilating surfaces will more than repay the cost of their production, but time may fail the geophyte which dares not risk being caught by the bad weather unprepared. These considerations have led me to look upon the Monocotyledon as an organism adapted primarily to a geophilous habit. The single cotyledon has been shown to be connected with this way of life in some Dicotyledons, and many of the features which distinguish Monocotyledons from Dicotyledons may be explained as having been formed by the conditions I have just described. Since I have adopted this view as a working hypothesis, the purpose of many details in the structure of Monocotyledons, which had puzzled me before, has become comprehensible." This paper is largely anatomical, and, in spite of the importance of such details, they must here be passed over. Various points of interest arise all through.

To many it must be new that the maturation of the embryo of the seed of *Ranunculus Ficaria* takes nearly two years after the seed is ripe. In *Eranthis hyemalis*, *Corydalis cava*, and several species of *Anemone*, the similar process of maturation is lengthy, but takes place in time for the seeds to germinate the following spring. Some seeds have been regarded as requiring the effects of frost and snow before they could germinate, but do not the above observations suggest that time alone may be the one necessity?—*R. I. L.*

Moorland Plants. By C. v. Tubeuf (*Nat. Zeit. Land-Forst.* i. pp. 237–246, 4 figs.; 1903).—Two papers are included here. The first calls attention to nodules found on the roots of *Vaccinium* (*uliginosum*, *Vitis-Idæa*, *Myrtillus*, and *Oxycoccos*), *Calluna vulgaris*, and *Andromeda Polifolia*. The appearance and anatomical structure are figured. Neither fungi, bacteria, nor any other cause could be detected. The plants grow on a peat-bog moor with much *Sphagnum*.

The second paper gives some observations on *Molinia cærulea*. When growing in a dry humus soil, it throws out stolons which produce swollen resting-buds at the nodes. In a *Sphagnum* moor the internodes grow vertically up so that the new buds are produced at a higher level than the earlier ones; in this way this moor grass, like other *Sphagnum* moor plants, keeps pace with the increasing thickness of bog moss. Tubeuf figures the mycorhiza of *Molinia*. The fungus lives inside the cortical cells, but does not seem to be present in every root.—*W. G. S.*

Mosquito Plant, The, *Ocimum viride*. Anon. (*Gard. Chron.* No. 866, p. 79; Aug. 1, 1903).—An abstract is given of a long letter from Dr. Prout, the principal medical officer in Sierra Leone, giving the details of various experiments carried out by him and Dr. Hood to test the supposed powers of this plant. The results of these experiments show that this plant, when growing, "has little or no effect in driving away mosquitos, and cannot be relied upon as a substitute for the mosquito net; that the fresh leaves have no prejudicial effect on mosquitos when placed in close contact with them; and that the fumes of the burnt leaves have a stupefying and, eventually, a destructive effect on mosquitos," but no one could remain in the room while the fumigation was in process of being carried out.—*G. S. S.*

Moth-trap. Anon. (*Gard. Chron.* No. 862, p. 7; July 4, 1903).—Acetylene lamps have been used in some of the vineyards in France with much success as a means of destroying night-flying moths. A shallow dish, about 20 inches in diameter, is arranged about 8 inches below the burner, which contains water with a little paraffin-oil poured on the top, so as to form a thick film on the surface. The insects are attracted by the light and fall into the paraffin below. The number of insects killed by these lamps is said to average 3,200 per lamp each night. The lamps are of 10-candle power, are placed about 550 yards apart, and are reported to cost not more than 2 cents per lamp per night.—*G. S. S.*

Mountain Glades, Vegetable Gardening in. By L. C. Corbett and K. C. Davis (*U.S.A. Exp. Stn. West. Virginia, Bull.* 81, April 1902,

figs.).—Records a series of experiments in vegetable farming in the mountain glades of the Alleghany Mountains. These glades vary in extent from a few acres to several thousands of acres, and are found at different elevations, from 1,700 feet above the sea to 3,000 feet, among the head waters of the streams which rise in the mountains of West Virginia.

Starting as shallow flat-bottomed depressions, first surface water stands in them, then fine soil is washed into them, and last, by the annual process of vegetable growth and decay, they become transformed from bogs into shallow pockets of rich alluvial soil mixed with a small percentage of fine sand on a subsoil of clay, crossed by shallow sluggish streams, and washed by the surface drainage of the surrounding mountain-tops.

The natural conditions of the particular glade in which the experiments were conducted made drainage the first and most difficult question. This once accomplished, however, the soil yielded readily to cultivation, and in conclusion the bulletin reports that the glade-land region compares to great advantage with the very best land for vegetable-farming in America, and that gardening in the glades of the Alleghany Mountains is commercially profitable.

Tile-drains are necessary for the lower glade-lands, and the soil must on no account be worked wet. Autumn ploughing and spring harrowing suit this land best, and the time gained in the spring by too early planting is usually paid for at a high rate in the yield of the crop.

Glade-land will give good crops of Hay, Corn, and Buckwheat without fertilisation, but for vegetable-growing 30 bushels of lime per acre is of decided benefit. Stable manure gives good results in a dry season, but in a time of heavy rain causes the soil to hold too much moisture.

The experiments here recorded were continued for three years, and included the culture of Cabbages, Onions, Squashes, and Celery; the Celery alone proving unsatisfactory so far.

It is declared inadvisable to grow Cabbage for two years on the same soil and the continuous cropping of Onions might also be detrimental.

Of the nineteen varieties of Squashes tried the three yielding best were 'Boston Marrow,' 'Golden Hubbard,' and 'Livingstone Pie.'—*M. L. H.*

Mulberry Leaf-mould (Sur le "blanc" des feuilles de Mûrier de Madagascar, *Ovulariopsis moricola* [Del.], by Dr. G. Delacroix (*Bull. Soc. Myc. Fr.* xix. p. 342, with fig.).—This disease appears to have attacked the leaves of the Mulberry (*Morus alba*) in Madagascar, and seems to threaten the silk industry. The patches resemble those of an *Oidium* on the under surface of the leaves. The conidia form the ultimate cell of the hyphæ, and are solitary, of an elongated lemon shape, and hyaline ($60 \times 20\,\mu$). Pycnidia are afterwards developed amongst the mycelium, resembling individuals of the genus *Phoma* ($80\,\mu$ diam.) containing hyaline stylospores (6×2 or $2\frac{1}{2}\,\mu$). The hyphæ and conidia appear to be faintly tuberculose.—*M. C. C.*

Narcissi, New. By F. W. Burbidge, V.M.H. (*Gard. Mag.* No. 2608, p. 709; 24/10/03).—The Daffodils of recent introduction are reviewed, and a comparative list of prices of the new ones in 1902 and 1903 is given, showing the drop in one season.—*W. G.*

Narcissi, The Transplanting of. By J. Cornhill (*Gard.* p. 216; 26/9/03).—The advice of an old Daffodil-grower to transplant when the clumps become "more leafy than flowery" is good as far as it goes, but it is certainly better not to wait until that stage of deterioration is reached. Those who grow Narcissi for sale must lift the bulbs annually, and some amateurs do the same, believing that the lifting and drying off help to mature the bulbs. In some soils and localities this may be the case, but the practice need not be universally followed.—*E. T. C.*

Narcissus Leaf-brand. By J. Ritzema Bos (*Zeit. f. Pflanz.* xiii. pp. 87–92; 1903).—A common disease in the bulb-gardens in Holland is known by the name "hot-fire" or brand. The leaves become yellow first on the margins, later over the whole leaf. If the weather be warm and moist in May and June, the effect on the new crop of bulbs is that they remain small and unsaleable. The author has traced the disease to a fungus (*Heterosporium gracile*) already well-known on Iris leaves. Experiments with Bordeaux mixture gave excellent results—healthy leaves and larger saleable bulbs.—*W. G. S.*

Nepenthes Burkei and N. B. excellens. By R. Jarry-Desloges (*Rev. Hort.* June 1, 1903, pp. 258–9; coloured plate).—Two very pretty forms, the latter especially. Culture specially easy. Strongly recommends hybridising with others, owing to robust and rapid development, *plus* merit of form and colour.—*C. T. D.*

Nicotine in Bordeaux Mixture (*Le Jard.* June 20, 1903, p. 192).—It is stated that 10 grains of nicotine to a pint increases the efficacy of the Bordeaux anti-mildew mixture.—*C. W. D.*

Nitrate of Soda, Field Experiments with, on Forage and Market-Garden Crops. By Edward B. Voorhees (*U.S.A. Exp. Stn. New Jersey, Bull.* 164).—A series of experiments were commenced in 1898 with a view to ascertain the value of applications of nitrogen in various forms. During the last two years nitrate of soda has been the form used. It was selected primarily as being the standard form of nitrogen, and on account of its ready solubility in water. The market-garden crops were all on land of a uniform character and well adapted for the crops grown in the experiments. Five plots were used, each being a tenth of an acre in area. Special directions as to method and time of application were given to ensure uniformity. Carrots, Cabbage, and Celery were treated with quantities of 300 lbs. and 400 lbs. each at one or more applications. Carrots were slightly decreased in yield by increased nitrogen in all cases. Cabbage and Celery were more than doubled in yield by an increase of nitrogen, which proved a good investment, showing in the best of the Cabbage plots a return of $9·67 for every $1 invested, and in the best of the Celery plots $39·05 for every $1 invested in nitrogen.

The best results were obtained when from 300 to 400 lbs. per acre were applied in three dressings, the first when the plants had made a good start, the second and third according to the season and the growth

of the crop. In each case the use of the nitrate was followed by largely increased profits.

The use of nitrate for forage crops is also discussed in this bulletin.

E. F. H.

Nitrogen, Assimilation of Atmospheric. By Prof. F. D. Chester (*U.S.A. St. Bd. Agric. Delaware, Rep.* 1901–2, pp. 64–77).—This paper gives a good summary of what is known regarding the work of bacteria in the soil as regards nitrogen, and deals specially with leguminous plants, nitragin, and alinit. The use of nitragin (a pure culture of the bacteria which form nodules on roots of Peas, Beans, &c.) is deprecated except on barren or worn-out soils, where for a first crop of any particular legume an application may be beneficial. It is pointed out that alinit (a pure culture of *Bacillus ellenbachiensis*, an organism having the power of fixing free nitrogen), even if really efficacious at all, can have but very slight influence, at any rate in a single year. The best results are usually to be obtained by giving the organisms already present in the soil the best conditions for their growth.—*F. J. C.*

Nuclear Membrane, its Relationship to the Protoplast. By A. A. Lawson (*Bot. Gaz.* vol. xxxv. No. 5, p. 305, pl. xv.).—The author traces the history of the formation of the fully-developed nucleus in the spore mother-cell of *Passiflora cœrulea*, and of the archesporial cell of *Equisetum limosum*, from the arrival of the chromosomes at the poles after mitosis. The chromosomes are at first free in the general cytoplasm. They then fuse together into an irregular mass of chromatin; vacuoles are formed containing karyolymph. These unite, forming (in *Passiflora*) a central vacuole with a superficial layer of chromatin. It is at this stage where the author traces a procedure parallel to the formation of vacuoles and the primordial layer of a cell. The chromatin now becomes differentiated into masses, and the karyolymph comes in contact with the bounding cytoplasm. At that moment the nuclear membrane appears as a bounding layer of cytoplasm. The karyolymph increases in quantity, while the chromatin becomes further differentiated into the spirem condition in preparation for a new division. Nucleoli appear simultaneously with this last stage.

In *Equisetum*, the vacuoles are numerous, and do not fuse into a central one.

The author concludes that the only part which is truly nuclear is the chromatin, the nuclear membrane and the karyoplasm being non-existent in the early stages, and lost later when the former becomes lost in the cytoplasm.

He thinks that this throws light upon the much-discussed question whether bacteria and other low organisms have nuclei; for chromatin-like bodies have been detected, and may thus resemble the early stages of nuclei-construction seen in higher plants.—*G. H.*

Nutrition, Relation of the, to the Health of Plants. By A. F. Woods (*U.S.A. Dep. Agr. Year Bk.* 1901, p. 155; plates).—This is a really valuable contribution dealing with an all-important subject, and the plates are particularly well done and sometimes coloured. The writer opens

by stating that the study requires the most careful technical research and seems to have been greatly neglected by plant physiologists and pathologists. Similar symptoms may develop in the plants from the most diverse causes. All the conditions of environment and hereditary tendencies must be known. The kind and quantity of food is a prolific source of variation, for a plant grown on a rather poor soil compared with one grown on a very rich soil might not at first be recognised as the same. Plants of course obtain their nitrogen from nitrates in the soil, and are not able to absorb it from the air.

The following table is given of the analysis of the Clover plant, showing the percentage of the elements :

Carbon	47·4
Oxygen	37·8
Hydrogen	5·0
Nitrogen	2·1
Sulphur	0·12
Phosphorus	0·30
Remaining ash	2·0

From 70 to 90 per cent. of the weight of living plants is water.

In many cases it requires very careful watching to prevent starvation and stunting in light soils. These conditions, however, favour some crops, like Sweet Potato and Peach. The ideal condition of a soil for ordinary field and greenhouse crops is one in which it resembles a sponge, and in which it will retain the greatest amount of nutritive substances and water without losing its capacity of absorbing air. The greatest dangers due to unsuitable mechanical conditions of soils are poor drainage and consequent excess of water and lack of oxygen. Plants, especially trees growing where the surface soil becomes caked and packed, are likely to suffer for want of oxygen for the roots.

The soil foods necessary to plant growth are fully explained under the following heads : Influence of magnesium and lime ; function of calcium in the soil ; importance of potassium ; is chlorine a food ? function of phosphoric acid ; nitrogen as a constituent, and its effect on growth.

The question of excess of food in solution is discussed. If the solid matter in solution in a soil exceeds 1 part in 500 parts of water, it is bearing a limit beyond which many plants are likely to suffer ; the leaves turn yellow on the edges, become spotted and drop off, or growth is checked, shortened, and compacted ; the leaves often become puckered and twisted.—*V. J. M.*

Nymphæa 'George Huster' (*Gard. Mag.* No. 2600, p. 578 ; 29/8/03).—An illustration with descriptive note of this beautiful new hybrid Water-Lily, said to have been raised from *N. stellata* (as one parent) by Mr. Dreer of Philadelphia.—*W. G.*

Odontoschisma Macounii, and its North American Allies. By A. W. Evans (*Bot. Gaz.* vol. xxxvi. No. 5, p. 321, pls. xviii.–xx.).—These Hepatics were collected in the Yukon Territory, and the author describes

them at full under the following heads: Generic characters, branching, leaf-cells, under-leaves, the female branch, gemmiferous branches, comparison of the genera *Odontoschisma*, *Anomoclada* and *Cephalozia*. The paper concludes with full descriptions of five species.—*G. H.*

Odontoglossum crispum var. **marienfeldiense** (*Gartenflora*, 1/11/03, p. 561; pl. 1520).—A coloured plate and brief description of this recently noted form of *O. crispum*.—*J. P.*

Oils, Ethereal, Use of, in Plants. By Kienitz-Gerloff (*Bot. Zeit.* May 16, 1903, pp. 150–1). Abstract from 'Flora,' 1903, 92, pp. 147–199, by Karl Detto.—These oils are considered by some authorities to serve as checks upon transpiration, lowering the temperature of the plants by their evaporation. Others, however, regard them as a protection against damage by animals and insects, especially as many xerophytes secrete no such oils under circumstances of drought which would render them of service in the former respect. The surface glands, therefore, are regarded by the writer as purely protective, since snails avoid them, though they will devour the plants if freed from oil by alcohol and subsequently washed. Ants also avoid them owing to their adhesive nature, according to trials made with *Dictamnus albus*. The mimicry between *Lamium album* and *Urtica* does not deceive rabbits, which devour the former and avoid the latter.—*C. T. D.*

Olearia Gunnii (*Gard.* p. 313; 9/5/03).—Though not so hardy as its New Zealand relative, *O. Haastii*, it is not exceptionally tender, and good bushes of it may be seen in flower in Herefordshire. *O. stellata* was for some time considered a distinct species, but is now only recognised as a variety of *O. Gunnii*. It succeeds best in a sunny position and is not particular as regards soil; and although it cannot equal *O. Haastii* in the number of its flowers, it has a far more graceful habit, which renders it more ornamental as a garden tree.—*E. T. C.*

Olives in Andalusia. By C. Sprenger (*Bull. R. Soc. Tosc. Ort.* 11, p. 330; November 1903).—The value of the Olive Oil obtained annually in Italy is 200,000,000 lire, while that of Spain amounts to 250,000,000 lire. In 1897 Tunis possessed 10 million Olive-trees, producing annually 25 million lire worth of oil. While in Italy the Olives grown are tall and thick of stem, as in Calabria, in Spain they are dwarf and in the form of low shrubs even in the richest soil. Three or five trees are planted together, forming in time a compact mass whose branches touch the soil and whose crown shades the ground. They cover the valleys and hills, rising to a height of 200 metres above sea-level. No other kind of culture interferes with them in any way. The Olives are easily gathered, even by boys, and are never beaten down from the trees. The fruit is always superior to Tuscan, which is gathered from mature or semi-mature, and often spoiled land. Parasites, such as *Mosca olearia*, *Lecanium Oleæ*, and others, are more easily kept at bay. In planting, the plants never lose their fruiting-wood, nor suffer from winds or bad weather. Nothing but Olive-gardens is seen throughout the rich country of Sierra Morena, and towards Estremadura. In January the shrubs are covered with black

fruits, often of great size, which are only gathered when mature, as only in such condition is the best oil obtained from them. In Andalusia the following varieties are grown: 'Ojiblanca,' 'Corrasqueña,' 'Manzanilla,' 'Tempranilla,' and 'Neradilla.' The first-named is the most productive but the earliest are the three last-named.—*W. C. W.*

Oncidium platybulbon Rgl. **and O. præstans** Rchb. fils. By Eduard v. Regel (*Gartenflora*, 1/9/03, p. 449; pl. 1518).—Coloured plate and short description of these two somewhat uncommon Orchids.—*J. P.*

Onion-growing in the Cache à la Poudre Valley. By Wendell Paddock (*U.S.A. Exp. Stn. Colorado, Bull.* 81, March 1903; plates).—A paper of hints to the growers of Onions in the Cache à la Poudre valley, where this vegetable seems to have been made a speciality of since 1880. Advice is given on the best soil for Onions, on the preparation of the land, on fertilising, sowing, cultivation, irrigation, harvesting, on the choice of varieties, on storing, and on the prevention of disease or damage by insects. The variety which best meets all requirements in this district, out of the many tested, is 'Yellow Globe Danvers,' and it appears that the seed supplied by seedsmen is so greatly influenced by the climate of the valley that the larger part of the seed now used is home-grown.—*M. L. H.*

Opuntias. By A. Berger (*Gard. Chron.* No. 867, p. 89, figs. 32 to 42 incl.).—A very interesting account is given of this curious genus, to which the motto "Nemo me impune lacessit" applies even better than it does to the Scotch thistle, as the spines of these Cactus-like plants are most intractable. The Opuntias are a well-known genus of the Cactus family; they were considered by Linnæus to be varieties of one species, and were named by him *Cactus Opuntia*. De Candolle was of the same opinion, but Miller was the first to establish the genus, using Linnæus's specific name. Since those days many new species have been added, and the number of species now amounts to between 140 and 150. A short table is given showing the differences between the various genera, and a brief account is given of several of them.—*G. S. S.*

Orange, Mandarin, in Florida. By H. H. Hume (*U.S.A. Exp. Stn. Florida, Bull.* 66; 2 plates).—A useful study of this group of varieties of the Orange, dealing with the introduction into America, names, descriptions of nine varieties and tables of weight and dimensions, &c., percentage of acid and sugar, and fertilisers removed from soil.—*E. A. B.*

Orange Weevil. By E. S. Panton (*Bull. Dep. Agr. Jam.*, vol. i. pt. 11, p. 249).—The Orange Weevil, called the 'Fidler,' represents a West Indian group of snout-beetles of the family *Curculionidæ*. Probably all varieties feed on *Citrus*, the commonest being *rubro-vittatus* (figured). The adults feed on the leaves, while the grubs attack the roots. The former effect no great injury, while the grubs, which are white, fleshy, and footless, do serious harm.

Mr. Panton thinks the grubs only feed on decaying roots after the Citrus trees have become diseased by a mysterious cause, which is very prevalent, in which the taproot rots off, and the heartwood of the trunk

and branches decays. He suggests a lack of sufficient drainage as the cause of the disease. He then considers remedies for the destruction of the beetles. Finally he describes the burrowing wasp *Elis atrata*, which supplies its grubs with those of the beetle. It is a solitary wasp, known as the 'Grave-digger,' from its habit of burrowing into the ground, in which it buries the beetle-grub, grasshopper, or other insect, after paralysing it with its sting.—*G. H.*

Orchard Culture, Experiments in (*U.S.A. Exp. Stn. Maine, Bull.* 89, February, 1903; figs. and plates).—This bulletin gives the results of extensive experiments in this State, extending over several years. The figures given show the relative values of mulching and cultivating, and the latter in general makes a better show. All orchards do not seem susceptible to cultivation, and in such cases some other method of treatment has to be devised. A heavy mulch of hay, straw, or sawdust (preferably not fresh sawdust) conserves the moisture and prevents the growth of robber plants—weeds; to this extent favouring the growth of trees. As a result of long experiments it has been proved that potash fertilisers greatly improve, not only the foliage, but also the fruit, both in quantity and quality. An excess of potash, however, in whatever form applied, had no effect in warding off attacks of the Apple scab. Orchard renovation receives special notice, and diagrams are given to explain top grafting, &c.—*V. J. M.*

Orchard, Planting a Small (*Gard.* p. 315; 7/11/03).—Suitability of site is often overlooked, and standard trees intended to form an orchard are planted in positions where they are exposed to cold winds without a thought of providing shelter. Bad drainage is another cause of failure. These points should be considered before a start is made. Let every planter avoid the common error of buying trees and sticking them into holes in grass land, expecting them to grow without further attention. Soil and situation, planting and varieties are fully discussed.—*E. T. C.*

Orchards, Top-working of. By G. Harold Powell (*Yearbook U.S. Dep. Agr.* 1902, p. 245).—A method is explained by which unprofitable orchards may be made profitable by top-grafting, *i.e.* working the tops of the trees with buds or scions of better kinds. Trees so treated will bear three or four years earlier than if treated by grafting in the ordinary way. The process is fully described, with illustrative diagrams.
C. W. D.

Ornaments, Garden. By Richard Davey (*Gard.* p. 338, 14/11/03; p. 359, 21/11/03).—Articles on leadwork figures as garden ornaments. Leadwork is most suitable for this purpose, as marble is rare and may not be exposed to our humid climate with impunity. Nothing makes a finer effect against a background of the rich and varied green which is so peculiarly English than the dull silver grey of lead.—*E. T. C.*

Osteomeles anthyllidifolia (*Journ. Hort.* October 15, 1903, p. 348).—This rare native of India and the Pacific Islands has proved hardy for several seasons under a south wall at Kew. It is evergreen, and bears berries like those of a *Cotoneaster*.—*C. W. D.*

Ovule of Casuarina, Development of. By H. O. Juel (*Flora*, vol. xcii. 1903, pp. 284–293; t. viii., 1 cut).—The author has examined two species, one, undetermined, from near Algiers, and *C. quadrivalvis* Labill., from Naples. The cells of the archespore or embryo-sac mother-cells, distinguishable by their large nucleus, by two successive complete divisions give rise each to a row of four distinct cells. This must be regarded as a true tetrad division. The first mitosis is preceded by the synapsis and dolichonema stages, and is essentially heterotypic; the number of chromosomes is probably twelve. Dark masses of condensed cytoplasm something like centrospheres appear one at either end of the original cells, but do not divide and are found after division at the distal side of the nucleus of the apical and the basal cell of the tetrad respectively; they are probably trophoplasmic.—*M. H.*

Oxygen, Withdrawal of, its Effect on Plants. By Max Dude (*Flora*, vol. xciii. 1904, pp. 205–252, figs. 1–2).—The subjects were placed in vessels from which the air was first exhausted and then replaced by hydrogen. Seeds and spores bear the absence of oxygen for a long time but finally die. After the termination of shorter exposures germination is delayed; after longer exposures the germlings are weakened and imperfect. Vegetating Moulds are damaged and finally killed by the process; the time needed varying with the nutrient solution (*e.g.* glycerin 1 h., cane sugar 4 h.). Vegetative organs of flowering plants resist the treatment for a few hours only, though parts capable of resuming meristic activity may show it after some days; if the treatment is arrested before death, all vital processes are delayed for some time longer. Young, actively developing parts suffer most, and roots more than shoots [subterranean more than aerial?]. Higher temperatures favour the effect of deprivation of oxygen.—*M. H.*

Palms, The Collecting of. By U. Dammer (*Not. König. Bot. Berlin, Bd. IV.*, pp. 59–61; July 10, 1903).—A note on how to select and preserve properly representative portions of these—for herbarium purposes—unwieldy plants.—*H. M. W.*

Pampas Grass, The Nomenclature of. By O. Stapf (*Gard. Chron.* No. 885, p. 399; Dec. 12, 1903).—This plant was known for many years as *Gynerium argenteum*, but in 1897 Dr. Stapf pointed out in a note in the 'Gardeners' Chronicle' (Ser. iii. vol. xxii., p. 358, 378, 396) that it did not belong to that genus, and proposed the name of *Cortaderia*, which has been adopted by various botanists. It now appears that Lemaire recognised in 1855 that the Pampas grass was not really a *Gynerium*, and named it *Moorea*, but did not use the name when writing of the plant subsequently. Dr. Stapf says: "Deeply convinced of the necessity of limiting changes of names to a minimum, I refrain under the circumstances from resuscitating Lemaire's name."—*G. S. S.*

Papaw, The Story of the. By F. B. Kilmer (*Bull. Dep. Agr. Jam.*, vol. i., pt. 8, p. 181).—Regarding Central America as the native country of *Carica Papaya*, it is now abundant between the isothermal lines of 77°; and is cultivated north and south of them.

The native uses are many: the bark for ropes; fruit is edible, very nutritious, and a great aid to the digestion. The ripe, yellow fruit is eaten like melons. Together with some acid fruit, it is made into pies, or stewed; while the green fruit, which has a strongly marked acrid principle, is pickled. Just before ripening, the fruit is peeled and boiled as a vegetable.

As a medicine, the seeds are reputed as anthelmintic, are used in a drink for fevers, while syrups, wine, and elixirs made from the ripe fruit are expectorant, sedative, and tonic.

A paste made with Papaw milk is applied to ulcers with great healing effect, such as those produced by the chiga in the feet of negroes.

The green leaves, or slices of the green fruit are rubbed over soiled clothes, as it dissolves stains, and is consequently called 'Melon bleach.'

The beautiful skin of the inhabitants of the Antilles is said to be due to the use of the Papaw fruit as a cosmetic, a slice being rubbed over the body.

It is now used in America as a cure for dyspepsia, as dyspepsia is unknown in its tropical home.

The meat in the West Indies is tough and tasteless; beef, mutton, pork, or fowl have the same flavour, and are exceedingly tough. The Papaw rubbed over the meat renders it soft, and changes a piece of apparent leather into a tender, juicy steak. It is put into the pot with meat, enters into cereals, soups, stews, &c., and they are made more edible and digestible.

The author discusses the botanical names and characteristics of the varieties, as well as the cultivation and growth.—*G. H.*

Paraná-Paraguay River Region, The Woody Plants of the. By Dr. R. Endlich (*Not. König. Bot. Berlin, Bd. IV.*, pp. 1-61; July 10, 1903).—An account of collections made in 1896–98, with notes on distribution, uses, times of flowering, &c., with abundant references to other workers, and an interesting section on the economical uses of Palms. The paper ought to be of service to travellers.—*H. M. W.*

Paris quadrifolia L., its Variability in the District of St. Gall. By P. Vogler (*Flora*, vol. xcii., 1903, pp. 483–489).—This is a statistical investigation, and it is unfortunate that the results have not been plotted on curves, as over 1,200 examples were carefully examined. The conclusions are: The variability in number of the organs increases acropetalously. The number in each verticil is *usually* equal to, or less than, the preceding one. The individuals whose outermost verticil differs most widely from the norm show a corresponding lack of constancy in the other whorls. The variations appear largely due to nutrition, and not of racial significance.—*M. H.*

Peach and Nectarine Culture. By T. Coomber (*Gard. Mag.* No. 2603, p. 620; 19/9/03).—The culture of these fruits under glass is described by one who is a well-known cultivator. He discusses the comparative advantages of large and small houses, arrangement of trellises, borders, and all details necessary for success.—*W. G.*

Peach-growing in Missouri. By Prof. W. L. Howard (*U.S.A. St. Bd. Missouri, Bull.* June 1903; figs.)—The writer declares that Peach-growing has become one of the important industries in this State, since the fruit can be grown in almost any part of it. The chief requirement of a soil for successful Peach-growing is that it be porous enough to afford a good bottom drainage, and this is of far more importance than fertility. A rich soil is not necessary for growing good Peaches. On the contrary, land may be too rich, in which case the trees would spend most of their energy in making good wood growth and bear but little fruit. In general, a Peach orchard should be situated on high ground; a level plain would not be desirable. The writer advocates the planting of good trees, not necessarily the largest ones, a poor tree being dear at any price. A good tree is one that has made a vigorous stalky growth.

Diagrams are given to illustrate methods of pruning, &c., and full directions on this head. For winter protection whitewashing or baling is recommended, this being the next best thing to building sheds over the trees, the latter course being naturally too expensive. For a commercial orchard the writer advises the growth—in that country—of the 'Elberta,' the 'Champion,' and 'Salway.'—*V. J. M.*

Peach-growing in West Virginia. By K. C. Davis (*U.S.A. Exp. Stn. West Virginia, Bull.* 82, 4/1902; illustrations).—This bulletin gives an account of the increasing Peach-growing industry in West Virginia, with notes on the extent to which Peaches are grown in the various counties of the State. The worst enemies of the industry are the 'Peach-borer,' against the attacks of which washing the tree-trunks in spring or early summer with a preparation of lime and water containing soft soap is recommended. The 'Peach curculio' is caught in the early morning on sheets spread beneath the trees while they are jarred; and the 'fruit bark beetle' attacks old trees. The 'San José Scale' which is prevalent in some places, the 'black spot' of the fruit, 'brown rot,' 'leaf-curl,' and 'yellows' have been dealt with in previous bulletins of this station (Nos. 66 and 78).—*F. J. C.*

Peach, Pruning and Marketing. By J. H. Hale (*U.S.A. St. Bd. Agric. New Jersey, Rep.* 1902–3, pp. 269–292; 5 plates).—The author considers that the best results are obtained by keeping the trees short. Expense is saved in pruning and in gathering the fruit, in addition to which the fruit, since it is less handled, keeps better. The fruit is packed into *rigid* baskets, sorted by girls, who do the work better and quicker than men, and taken to market by electric trolly, there being a siding on the fruit farm. Spraying for scale, &c., is carefully carried out every year on the author's large fruit farm, and the weevil is caught by jarring the trees over a sheet stretched on a frame 12 ft. by 6 ft.; the sheet is carried by two boys or two girls, while a man goes round and jars the tree with a battering ram padded with rubber. Only 4 per cent. of the fruit was injured, while a neighbour who did not practise this lost 60 per cent.

Summer pruning is largely carried out, just at the time when the season's growth is finished. Cow Peas and Clover are regarded as the best cover-crop for the orchard, since both supply nitrogen to the soil.

F. J. C.

Peach Trees, Laying Down of. By Wendell Paddock (*U.S.A. Exp. Stn. Colorado, Bull.* 30, March 1903; plates).—After repeated disappointments a device has been elaborated for growing Peaches in the severe climate of Cañon City, Colorado. Early in November the earth is removed in a circle about four feet in diameter round the tree. Water is then poured into the hole and the trees worked backwards and forwards until the roots are so much loosened that the tree can be pushed over on to the ground on one side or the other. The limbs are then tied together with cord and covered with burlap held in place by earth.

Great attention is needed in spring to see that the blossoms do not open prematurely, nor that the branch buds are forced into white growth. The covering should be first loosened and removed by degrees, and by the middle of May, at Cañon City, the trees are ready to be raised again into position. Props are usually required to support them in an upright position through the summer. Old trees will not usually bear this treatment, which should be begun as soon as the young stock is one year old.

In Berthoud, fifty miles north of Denver, fifty boxes of Peaches were produced by thirty trees, treated in this way, the third year after planting.

M. L. H.

Pearls in Cocoanuts. Anon. (*Gard. Chron.* No. 860, p. 396; June 20, 1903).—These curious growths in Cocoanuts are by no means novelties, though they are seldom seen, and it is only comparatively recently that they have been brought to England. It appears that more than two hundred years ago the celebrated botanist, Rumph, sent one set in a ring as a present to the Grand Duke of Tuscany, and Rumph, in his great work, described and figured it. The natives in the Philippines are said to value them very highly, and to keep them as charms against diseases and evil spirits. Dr. Hickson brought one home which is now in the Museum at Kew; it is almost egg-shaped and quite white. These pearls are said to be of the same formation as the ordinary pearls found in shells, and to be almost entirely composed of carbonate of lime.

G. S. S.

Pear 'Le Brun' (*Gartenflora*, 1/10/03, p. 505; pl. 1519).—Coloured plate and description of this Pear, obtained in 1855 from mixed seed of 'Winter-Dechants' Pear and 'Beurré d'Arenberg.'—*J. P.*

Pear-tree Psylla. By C. M. Weed (*U.S.A. Exp. Stn. New Hampshire, Bull.* 102; 5/1903).—Injuries to Pear trees in New Hampshire were caused by this insect (*Psylla pyricola* Foerst) in 1902. The insect is an ally of the aphis, and has, annually, several broods, somewhat differing in appearance, the winter form being dark, the summer light. When mature the insect has four nearly transparent wings, and is of a reddish colour, with transverse dark stripes on the abdomen. The first batch of eggs is laid by the winter form in early spring and hatches three or four weeks after, the brood becoming mature in about one month. The insect may be kept in check by spraying with a kerosene emulsion diluted with twenty-five parts of water during the growth of the first brood before they reach maturity. The insects suck the sap from the leaves, and this, passing through their bodies, is ejected on the foliage, where it forms "honey-

dew." The spray is best applied soon after a shower has washed off some of the honey-dew.—*F. J. C.*

Pea Spot, Ascochyta pisi (*Journ. Hort.* August 13, 1903, p. 157).—A life-size illustration of this pest growing on Sweet Peas. The remedy is spraying with sulphide of potash of the usual strength of two ounces to three gallons of water.—*C. W. D.*

Perfumes (*Journ. Hort.* May 14, 1903, p. 423).—Obtaining these from flowers by distillation is a very ancient art, but chemistry produces many imitations, some of which are so similar to the real essence and so cheap as to have driven the true article out of the market.—*C. W. D.*

Phaius Chapmani superbus (*Gard. Mag.* No. 2601, p. 593; 5/9/03).—An illustration and descriptive note on a very beautiful new hybrid between *P. Humbloti* and *P.* 'Phœbe.' It is undoubtedly one of the finest hybrids yet raised.—*W. G.*

Phaius Hybrid and Calanthes. By H. G. Chapman (*Gard. Chron.* No. 861, p. 411, fig. 159, and supplement; June 27, 1903).—Hybrids of the genus *Phaius* are by no means difficult to cultivate. They are of the greatest use in the spring for decorative purposes, and may be kept in a room which is not lighted by gas for six or eight weeks without injury. The names of the best hybrids are given, and full instructions as to their culture, &c. The best hybrid Calanthes are mentioned, and their usefulness for table decoration commented on. One difficulty in their cultivation appears to be the impossibility of preventing the foliage from "spotting," the cause of which is not known.—*G. S. S.*

Phosphate Manures. By H. H. Cousins (*Bull. Dep. Agr. Jam.* vol. i., pts. 6, 7, p. 127).—The author observes that he has always advocated the avoidance of "complete fertilisers" instead of the usage of "special ingredients"; because there are three types of phosphatic fertilisers, and each is peculiarly suited to a particular type of soil: *e.g.* basic slag is often absolutely inoperative on calcareous soils, while superphosphate may result in detriment to the crop if applied to soils deficient in carbonate of lime.

The author supplies a table of proportions of phosphoric acid in four fertilisers, viz. two of basic slag, one of basic superphosphate, and a mixed phosphate. This is followed by observations upon them.—*G. H.*

Phosphoric Acid and Wine. By G. Paturel (*Ann. Agr.* p. 5; Jan. 1902).—Although only 7 to 15 kilos of phosphoric acid per hectare are taken up by the plant and only 3 kilos is present in the wine, nevertheless the best wines are found to contain the largest amount of phosphoric acid.

C. H. H.

Picotee, The. By James Douglas, V.M.H. (*Gard.* p. 379, 28/11/03; p. 393, 5/12/03).—There is really no difference between a Carnation and a Picotee except in the colour of the flowers. Both have descended from *Dianthus Caryophyllus*, a plant which not many years ago was to be found growing, presumably wild, on the walls of Rochester Castle.

Mr. Douglas defines a Carnation and a Picotee, giving the properties of each. The best varieties are mentioned, and full cultural details given.

E. T. C.

Pineapple Culture. By Albert H. Benson. Part III. (*Qu. Agr. Journ.* xii. p. 340, May 1903).—This part, in continuation, contains chapters on permanence of plantations, on replanting, on cultivation, on shelter, and on growth of subsidiary crops between Pines.—*M. C. C.*

Pineapple Culture, Soils in Florida. By H. Miller and H. H. Hume (*U.S.A. Exp. Stn. Florida, Bull.* 58; 9 plates).—Gives method of sampling, chemical composition, requisites of a good Pineapple soil, descriptions of localities, and characteristic wild vegetation.—*E. A. B.*

Pineapples, Cultivation of. By C. E. Smith (*Bull. Dep. Agr. Jam.* vol. ix. pt. 11, p. 161).—The author discusses the nature and analyses of the sorts, propagation, gathering, insects and diseases, and the varieties cultivated.—*G. H.*

Pine Beetle, The (*Gard. Mag.* No. 2598, p. 548; 15/8/03).—A descriptive life-history of this destructive insect (*Hylesinus piniperda*), which causes so much damage to coniferous woods and plantations.

W. G.

Pine: Bluing and Red-rot of the Western Yellow Pine. By Hermann von Schrenk (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 36, May 1903, 14 plates).—The investigations detailed were undertaken to determine—

(1) The cause of the blue colour in the dead wood of the Western Yellow Pine (*Pinus ponderosa*), and the effect of the colouring on the value of the wood.

(2) The reason for the subsequent decay of the wood, the rate of decay, and whether the decay could be prevented.

(3) Whether it would be possible to use the dead wood before it decayed; first, to reduce the fire danger; second, to prevent the decay and thereby save an immense quantity of timber.

It was found that the physiological changes were intimately connected with the attacks of the Pine-bark beetle (*Dendroctonus ponderosæ*), which enter the bark in July, August, and September. The first signs of disease noticeable in the affected tree are visible in the spring following the attack of the beetle. Very soon after the attack of the bark beetle the wood of the Pine turns blue. The colour is at first faint, but soon becomes deeper. After a certain period the whole sapwood will have a beautiful light blue-grey colour. The wood which adjoins the inner line of the blue wood is of a brilliant yellow colour, which contrasts sharply with the blue outside and the straw-yellow of the heartwood. The blue colour develops very rapidly when once the tree is attacked. As the cambium and bark cells lose water they shrivel and break from one another, so that in a few months the bark breaks away from the wood. Numerous white strands of fungus mycelium make their appearance after six months or more. The blue wood differs very little from the sound wood in

general appearance, save in colour. The blue wood is said to be much tougher than the green wood. Tests of strength showed beyond doubt that the blue wood was as strong as the green wood.

The blue colour of the wood is due to the growth of a fungus in the cells. After describing the various woods known to be stained green or blue by parasitic fungi, the author accepts *Ceratostomella pilifera* (Fr.), known in Europe as giving a blue colour to Pine wood, as the cause in the present instance. This fungus is then described in detail, and it is claimed that the infection of the wood is caused by the entrance of the spores at the beetle-holes already alluded to. After the wood has been dead for some time certain changes begin, which in the end result in the entire decay of the wood.

The "red-rot" of the Western Yellow Pine usually starts in the tops of the trees. The rot starts at the bark and gradually extends inwards. When the decay has gone on for some time, bands and sheets of white felty substance are found filling certain cracks which result from shrinkage. These sheets consist of masses of fungus threads densely interwoven. The entire wood mass becomes changed to a brown brittle mass, and the completely rotten wood crumbles into a fine powder when crushed between the fingers.

The "red-rot" is caused by one of the higher fungi, which grows in the wood, and brings about its decay. When the wood has been completely destroyed, the fruiting organs of the red-rot fungus begin to form. Some of the hyphæ grow through the bark, and form a flesh-coloured knob, which increases rapidly in size and turns reddish in colour. This knob widens horizontally, and on the lower surface numerous pores appear. After a year a mature fruiting body is developed, which becomes technically a member of the group of *Polyporei* of the genus *Fomes*, and, as it presents differences considered sufficiently characteristic, has been named *Fomes ponderosus* (Schrenk).

Finally it is recommended that the dead timber should be removed at once, and that the wood which should be removed is the dead and beetle-infested timber.—*M. C. C.*

Pith Moth, The (*Gard. Mag.* No. 2596, p. 509; 1/8/03).—This destructive insect (*Laverna atra*) is described and illustrated. As larvæ it injures and kills the terminal shoots of young fruit trees, and is therefore particularly harmful in nurseries. The life-history is given, its various stages of development being described and illustrated. As a preventive measure it is said that hand-picking the dead shoots before the moths emerge in June is the most effective.—*W. G.*

Plane Trees. By L. Henry (*Le Jard.* July 20, 1903, p. 212).—A history of the cultivation of the Oriental and the Occidental Plane, with illustrations showing their differences.—*C. W. D.*

Plant Breeding: Recent Work in New Jersey (*U.S.A. Exp. Stn. New Jersey, Rep.* 1903, pp. 377–398).—Dr. Halstead reports the continuation of his experiments in plant breeding during 1902 (see JOURN. R.H.S. xxvii. p. 1157). The work of fixing varieties of Beans, Cucumbers,

Egg-plants, and Tomatos recorded in the last report has been continued, and the following results have been obtained in the effort to obtain a Sweet Corn combining the qualities of "Egyptian" and "Black Mexican." The seed was taken partly from a ten-rowed ear of red grains obtained in 1901 (*loc. cit. ante*), and partly from progeny (all bearing ten-rowed ears) raised in the greenhouse during the winter from the same ear. The latter seed was therefore one generation further removed from the original cross than the former.

Colour of Grains obtained (*5 average Ears*).

	From Greenhouse-grown Seed.			Previous Generation.		
	Uncoloured	Black	Red	Uncoloured	Black	Red
	15	0	365	60	0	444
	0	0	420	0	0	420
	36	0	360	10	0	550
	0	0	340	72	0	432
	20	0	380	0	0	480
Average	14	0	373	28	0	465
Average 1900	172	121	92			
„ 1901	90	81	261			

These results show a great gain in relative number of red grains as compared with previous years, and greater in the younger generation than in the older.

Some variation was again shown in the number of rows of ears in the cob.

	From Greenhouse-grown Seed.	Previous Generation.
8-rowed ears . .	3	6
10 „ „ . .	10	15
12 „ „ . .	42	38
14 „ „ . .	15	14
16 „ „ . .	6	6

The "Egyptian" influence in this character is thus shown to be continuous over that of the "Mexican," which is a definitely eight-rowed ear.

All the plants were smaller and of earlier maturity than in previous years.

Tomatos. "Much difficulty is experienced in getting a combination of yellow and red colour that yields a blush, and, when obtained, to have it regularly reproduced in the offspring."

Salsify Hybrids. While in the first generation there were two uniform types, it was far otherwise in the second. In the second there was a strong tendency to revert to the two parent forms (*Tragopogon pratensis* and *T. porrifolius*), but at the same time there were many intermediates.

Phlox Drummondii. Commercial varieties were crossed and numbers of variations have been obtained. It remains to fix some of the most attractive.—*F. J. C.*

Plants as a Factor in Home Adornment. By L. C. Corbett (*Yearbook U.S. Dep. Agr.* 1902, p. 501).—In this article, which may be said to deal with landscape gardening in general as practised in the U.S.,

we have a series of suggestions and rules for planting gardens of different dimensions. The materials dealt with are principally forest trees and shrubs. Grasses for boundary rows are recommended. Annual and perennial Vines, in which name all trailers and climbers are included, occupy an important place; but herbaceous plants are hardly mentioned incidentally as ornamental factors.—*C. W. D.*

Plants, Old World Names of. By R. P. Brotherston (*Gard. Chron.* No. 866, p. 69, Aug. 1, 1903).—The author in this paper criticises some of the statements made by Mr. Druery in his paper in a recent number (June 27) as to the origin of names, &c., and gives much interesting information on this subject. This paper should be read in conjunction with the one by Mr. Druery.—*G. S. S.*

Pleione, The Genus. By R. A. Rolfe (*Orch. Rev.* Oct. 1903, p. 289).—The structural differences from *Cœlogyne*, and other interesting particulars, of the various introduced and described species, are given.
H. J. C.

Plum Culture. By W. T. Macoun (*Can. Rep. Ottawa State, Bull.* 43, 7/03; 2 plates).—Gives a very full account of Plum culture, together with lists of varieties suitable for cultivation in the different districts of the province, and notes upon the fungal and insect attacks to which the Plum is liable. A chapter is added on chemical fertilisers suitable for use in Plum cultivation.—*F. J. C.*

Plums, Propagation of. By F. A. Waugh (*U.S.A. Exp. Stn. Vermont, Ann. Rep.* 1901–1902, p. 249).—A series of experiments with different varieties of Plums grafted on different kinds of stocks, to demonstrate what difference would be caused by the varying stocks. The difference was surprisingly apparent, even the first year. Tables of growth and memoranda of the trees are given, showing their progress in height, diameter, &c. A number of one-year-old trees were lifted and both stems and roots examined, the results of which are shown in tabulated form. So far as the experiments have been carried they tend to show that the greatest amount of influence is exerted by the health and vigour of the individual stock.—*E. F. H.*

Poplar Parasite (Sur le parasitisme du *Dothichiza populea* (Sacc. & Br.) sur diverses espèces de Peupliers). By Dr. G. Delacroix (*Bull. Soc. Myc. Fr.* xix. p. 353, with fig.).—This species of *Dothichiza*, previously said to inhabit dead branches of Poplar, is shown to occur on the trunks and branches of young Poplars, still living, of several species, as a true parasite. It is recommended that when attacked the young trunks and branches should be sprayed with a solution of sulphate of copper.
M. C. C.

Potato, Contribution to the Study of. By E. Bréal (*Ann. Agr.* pp. 545–576; Nov. 1902).—Humboldt and Bonpland found the plant wild in great abundance at a height of 3,600 metres in the Cordillera of the Andes. The roots were eaten by the inhabitants. At this height it freezes during the greater part of the year; during the day there is bright sun-

shine and the air is very dry. From the pulp of crushed frozen Potatos a poisonous alkaloid is extracted.

Noël Bernard, after studying the Orchid family, attributes the formation of tubers on the stolons of the Potato to the presence of a fungus of the genus *Fusarium*. Owing to the presence of this organism the tubers are formed earlier, more regularly, and closer to the stem, and do not appear at the extremity of the long running stolons which one sees in most plants. Placing farmyard manure in immediate contact with the seed Potato is very favourable to the spread of the fungus and infection of the root; in fact the manure itself often contains this fungus, and if germs of the fungus already exist on the seed Potato, the farmyard manure contributes to its development.

The practice recommended by Aimé Gerard, of choosing Potato seed from the plants which have produced the largest yield, has given excellent results. It is because these tubers come from strong buds borne by a parent plant richly infested with this fungus, and by which they are more capable of transmitting the fungus to their descendants.—*C. H. H.*

Potatos, Formation of Thread-sprouts in. By M. G. Delacroix. (*Comp. Rend.* December, 1900, p. 1006).—The term thread-sprouts is used in the case where the sprouts of Potatos grow considerably in length but remain slender.

When planted such tubers produce badly developed tufts, and often not a single shoot appears above ground, or if such do come through the soil they are morbid and rapidly shrivel and die.

Some varieties when planted in rich soil produce a crop, but the product of such diseased tubers always presents the characters of the disease.

When Potatos are dug up in the autumn those tubers which will produce the disease cannot be detected with certainty, and it is only towards the end of winter that the presence of thread-like sprouts indicates with certainty their nature. At this stage such tubers are often harder in substance than normal ones, and microscopic examination often reveals the presence of various organisms, *Bacillus solanicola*, *B. caulivorus*, *Fusarium Solani*, &c. None of these are, however, the cause of the disease. Neither can thread-sprouts be attributed to dryness of the soil.

The true cause of the disease is to be attributed to degeneration and lowered vitality, presented by so many varieties of Potatos, which is entirely due to the universal practice of vegetative reproduction: that is, continuously raising a crop from tubers instead of sometimes from seed.

Under such conditions a certain set of characters become hereditary, and the plants lose to a great extent the very important character of adaptability. As a consequence such tubers cannot resist the attacks of various fungi, bacteria, &c., which are successfully resisted by normal Potatos. Again, under the conditions stated, the tubers may become incapable of elaborating the necessary diastases or ferments for the solution of the substances required as food for new growths or sprouts, hence emaciated thread-sprouts are formed.

If Potatos are allowed to "sprout" in the light before planting, diseased tubers can be rejected; this method, however, is only a temporary

one, as in strains showing a tendency to form thread-sprouts the disease may appear at any future time.

The only certain cure is the occasional recourse to sexual reproduction, that is by seed, whereby the original stamina and power of adaptability are restored.—*G. M.*

Potato Disease, A new. Anon. (*Gard. Mag.* No. 2607, p. 691 ; 17/10/03).—A parasitic fungus known as *Chrysophlyctis endobiotica* is described and illustrated. It attacks the tubers and roots, and is said to be very destructive in its most virulent forms. It is said that it has found its way to this country from Upper Hungary, where it was first noticed by Schilberszky.—*W. G.*

Potato Disease: Rosette, Rhizoctonia. By A. D. Selby (*U.S.A. Agr. Exp. Stn. Ohio, Bull.* 139, April 1903 ; 5 figs.).—This disease is characterised by the early dying of the Potato vines before the formation of many tubers, the underground parts appearing to be the seat of the disease agency, while the excessive branching in some, and in general a conspicuous clustering of these branches or of the terminal leaf groups, together with the early dying of the entire tops, are the conspicuous above-ground characters. In examples examined, the stems above ground showed occasional discoloured areas of soft decay, while below the soil surface were numerous lesions in the form of brown dead areas. The diagnostic features in this malady arise from the changes in the stem by reason of its lesions below ground, or near the surface above ground, and from the peculiar branching or clustering of the leaves. Upon microscopical examination of fresh material, the apparently constant presence of the hyphæ of the fungus *Rhizoctonia solani* (Kuehn) was revealed. In 1902 the sclerotia of the fungus to which the disease is attributed were found in abundance upon tubers where the disease prevailed.

The sterile fungus *Rhizoctonia* is indicated as the cause of the disease in the cases examined by its constant presence, to which a high degree of probability is attached. It is found on the seed tubers which produce diseased plants ; such tubers, when stored in a warm place, have been grown to the production of elongated, etiolated, leafless stems, destroyed at the summit by the *Rhizoctonia*. The fungus grows vigorously in cultures, producing no clearly recognised spore-forms, but dense masses of the fungus threads or hyphæ. These masses, which are dark brown to almost black in colour, are capable of surviving under adverse conditions, and of growing and reproducing the fungus in a purely vegetative manner.

The warranted conclusion, drawn from tests of two seasons with formalin and corrosive sublimate, appears to be that corrosive sublimate seed treatment does not prevent the rhizoctonia disease to any appreciable extent, while the formalin seed treatment, as shown conspicuously by study of the growing plants, does prevent the disease to a very marked extent.

The formalin treatment is as follows :

Add ½ pint of formalin (40 per cent. strength) to 15 gallons of water, soak the seed tubers in it for two hours, then cut and plant.—*M. C. C.*

Potato Diseases and their Remedies. By L. R. Jones and W. J. Morse (*U.S.A. Exp. Stn. Vermont, Ann. Rep.* 1901–1902, p. 209).—The

early Potato blight *Alternaria solani*, the Colorado beetle, and other insect pests were treated on special plots with Bordeaux-Paris-green mixture. Comparisons were drawn between the above and Paris-green alone. Both were applied in one and two sprayings. It was found that Bordeaux-Paris-green mixture was the most satisfactory, and also that two applications were superior in effect to one only. In addition to the above experiments, seed Potatos were treated with formalin solution, corrosive sublimate, formaldehyde vapour, and formalin and sulphur vapour. In disinfecting, the tubers were moistened before treating. The results indicate that formaldehyde vapour applied to seed tubers in a moist condition greatly reduces the scab.—*E. F. H.*

Potatos. By E. Bartrum, D.D. (*Gard. Mag.* No. 2602, p. 610; 12/9/03).—Various points concerning Potato culture are discussed, especially the results of experiments carried out by various County Councils. The question of spraying with Bordeaux mixture, the cost, and details of application are dealt with in a practical and clear way.
W. G.

Potatos, Recently introduced. By G. Wythes (*Gard. Mag.* No. 2594, p. 479; 18/7/03).—The comparative merits of newly-introduced varieties of early Potatos are discussed. An impartial description of the most prominent varieties obtained from various sources.—*W. G.*

Potato, The Evolution of a. By C. T. Musson (*Agr. Gaz. N.S.W.*, p. 1043; October 1903).—A short account of the raising of a new variety of Potato from seed in Australia. The seed came originally from England, and the process of the experiment is given in detail. The object was to get an acclimatised form which would withstand the variable climate better than a variety not accustomed to a particular district. The points aimed at were (*a*) productiveness, (*b*) constitution, (*c*) size, (*d*) shape, (*e*) appearance and quality.—*H. G. C.*

Potash, Symptoms of Deficiency in. By Willfarth and Wimmer (*Zeit. f. Pflanz.* xiii. pp. 82–87, 2 plates; 1903).—The authors have observed that Mangolds grown in a soil with too little potash show this in the leaves. These are curled and assume a yellowish or whitish colour along the margin and veins, while the remainder of the leaf remains dark green. These symptoms are shown on an excellent coloured plate. Deficiency of potash can also be detected from the appearance of the leaves of Potato, Tobacco, and Buckwheat; figures of these are also given. It would be a useful guide to growers if these results were confirmed and more widely known. In plants grown with deficiency of potash the proportion of top (leaves, &c.) to root is largely increased; thus in Mangolds it may be as high as 90 per cent. as compared with 30 to 35 per cent. in fully-manured. Lack of potash also reduces the amount of starch or sugar in seeds, tubers, and other places of storage. Plants are also more liable to attacks of parasites, *e.g.* green fly, rust, &c.; while tubers (*e.g.* of Potato) are more liable to rot when stored.—*W. G. S.*

Prickly Pear, Destruction of (*Qu. Agr. Journ.* xii. p. 314, May, 1903.)—Mr. John Rudd, Superintendent of Police in Ceylon, reports the

destruction of Prickly Pear (*Opuntia Dillenii*) by the help of a beetle, thought to be allied to the cochineal insect. Many schemes are being proposed for the destruction of the Prickly Pear in Queensland, which now covers thousands of acres of plain and scrub land. If such an insect could be obtained this land could be reclaimed for agricultural and other purposes, and thousands of pounds sterling would be saved to the State.
M. C. C.

Primrose, The: Observations on Fertilisation. By a Field Naturalist (*Gard. Chron.* No. 850, p. 225; April 11, 1903).—The "pin-eyed" and "short-styled" varieties are described and figured. The writer differs from Darwin in his views that this "heterostylism" proves that the Primrose is not self-fertilising, and shows with much force that the short-styled or "thrum-eyed" variety is at any rate self-fertilised, and that it is very seldom that flowers of this variety are visited by insects.
G. S. S.

Primula elatior. By E. G. Gilbert (*Journ. Bot.* 488, pp. 280–2; 8/1903).—A suggestion that *P. elatior* is a hybrid between *P. veris* and *P. acaulis*.—*G. S. B.*

Primula elatior. By E. S. Marshall (*Journ. Bot.* 489, pp. 314–5; 9/1903).—Note in opposition to the suggested hybrid origin of the Oxlip.
G. S. B.

Primula megaseæfolia. By Sir J. D. Hooker (*Bot. Mag.* tab. 7901).—Nat. ord. *Primulaceæ*, tribe *Primuleæ*. Native of Asia Minor. This has been only found on the south-east shore of the Black Sea. The specific name is due to its resemblance to species of Saxifrage. The leaves are ovate, 3–5 inches long. Umbel many-flowered, 3 inches in diameter. Corolla is rose-red to crimson-purple.—*G. H.*

Propagation by Leaves (*Rev. Hort.* October 1, 1903, pp. 442–3).—Abstract of results of experiments by M. H. Lindemuth, who, in periods varying from seven to twenty-four days, succeeded in inducing to root the leaves of twenty-eight species of plants, viz.: *Achyranthes Verschaffelti*, *Arabis alpina*, *Celosia cristata*, *Citrus* sp., *Coleus hybridus*, *Cissus discolor*, *Digitalis purpurea*, *Episcia cupreata*, *Fuchsia hybrida*, *Mimulus hybridus duplex*, *Mimulus moschatus*, *Momordica Balsamina*, *Nicotiana rustica*, *Oxalis crassicaulis*, *Oxalis Deppei* × *lilacina*, *Petunia hybrida*, *Physalis Alkekengi*, *Pogostemon Patchouly*, *Raphanus sativus*, *Rivina humilis*, *Salvia officinalis*, *Saponaria officinalis*, *Scrophularia nodosa*, *Solanum Lycopersicum* (Tomato), *Tagetes erecta*, *Tanacetum Balsamita*, *Veronica longifolia*, *Vitis vinifera*.

The leaves of *Citrus* and also of *Camellia* form roots and live for months and even years, but form no buds. The leaves are severed as closely as possible to the axillary bud, and inserted in sandy soil face upwards.—*C. T. D.*

Protea mellifera. By Ed. André (*Rev. Hort.* July 1, 1903, pp. 308–9; coloured plate).—Termed at the Cape, its native habitat, the 'Honey Flower' or 'Sugar Bush.' Floriferous examples grown on the

Mediterranean littoral in the open by MM. Nabonnand frères, Vallauris. Forms a low-growing shrub with pendent branches, spreading over the soil, with tips recurved upwards; leaves slender and leathery, and each branch terminating in a large oval-oblong imbricated inflorescence, with white, yellow, and rose tints, about six inches long, and by the illustration very handsome and attractive. Hardy under glass in Paris; soil, sandy peat.—*C. T. D.*

Psychotria capensis. By W. B. Hemsley (*Bot. Mag.* tab. 7916).—Nat. ord. *Rubiaceæ*, tribe *Psychotrieæ*. This is apparently a common shrub in S.-E. Africa. It has a compact habit and fragrant flowers. These are yellow, about ½ inch diameter.—*G. H.*

Quince Parasite (*Stromatinia Linhartiana* Prill. et Del.). By Dr. G. Delacroix (*Bull. Soc. Myc. Fr.* xix. p. 347).—This is a description of a parasite on the leaves of the Quince, found in France, of which the conidia have been known as *Monilia Linhartiana* (Sacc.), as *Ovularia necans* (Pass.), and as *Ramularia necans* (Roum.), all three of which are regarded as the same species. The sclerotia which follow are credited with the production of a Discomycete for which the name of *Sclerotinia Mespili* (Frank) was proposed, but which is here called *Stromatinia Linhartiana* (Prill. et Del.). The *Peziza* have been found abundantly since 1900.—*M. C. C.*

Raspberry Beetle (*Gard. Mag.* No. 2601, p. 599; 5/9/03).—This is one of the regular Raspberry pests (*Byturus tomentosus*), though it attacks the Blackberry as well, both wild and cultivated. The insect is described in its various stages of development, but nothing very definite is stated in regard to its prevention or extirpation.—*W. G.*

Redwood (*U.S.A. Dep. Agr. Bur. Forestry, Bull.* 38).—As a timber tree the Redwood is highly valued in the United States, and even in this country it has received some attention in the matter of the quantity and quality of wood produced. Regarding this tree the following facts have been determined by Mr. R. T. Fisher, of the United States Bureau of Forestry:

That the Redwood reproduces itself abundantly by sprouts on cut-over lands, and occasionally by seed.

That in thirty years it will produce trees of 16 inches diameter, 80 feet high, yielding 2,000 feet board measure per acre; and that after careful lumbering it pays to hold cut-over Redwood lands for future crops.

It is interesting to learn that the wood of Deciduous Cypress (*Taxodium distichum*) and that of the Redwood are so nearly identical as to be often called by the same name. The chapters on Diseases of the Redwood and Insect Enemies are carefully compiled, and form, with the other portions of the pamphlet, the most valuable contribution to the tree and its timber that has yet been compiled. The illustrations are numerous and excellent.—*A. D. W.*

Rehmannia angulata. Anon. (*Gard. Chron.* No. 854, p. 290, fig. in supplement May 9, 1903).—This handsome plant was discovered in

Ichang, Hupeh, by Dr. Henry, but it has been introduced into cultivation by Mr. E. H. Wilson. It is a perennial plant, nearly allied to the Foxgloves; it grows to a height of from 1 to 3 feet, with purplish flowers growing in racemes.—*G. S. S.*

Report on the Success of Plants Contributed from the Royal Botanic Garden in Berlin to the Botanical Garden in Victoria. By Dr. Strunk (*Not. König. Bot. Berlin, Bd. IV.*, pp. 46–58; July 10, 1903).—Includes varieties of Cocoa, Kola, Coffee, Tea, Caoutchouc plants, Vanilla, Fibre plants, &c., and notes on their growth and success generally.—*H. M. W.*

Restrepia antennifera.—By W. B. Hemsley (*Bot. Mag.* tab. 7930). Nat. ord. *Orchidaceæ*, tribe *Epidendreæ*. Native of Colombia. Stems clustered, 6–8 inches high. Flowers 1–3 on each stem, $2\frac{1}{2}$ inches across, striped with dark purple on a whitish ground.—*G. H.*

Rhythm in Plants, On the Artificial Production of. With a Note on the Position of Maximum Heliotropic Stimulation. By Francis Darwin and Dorothea F. M. Pertz (*Ann. Bot.* vol. xvii. No. lxv. p. 94; Jan. 1903).—That parts of plants can acquire a habit of periodic movement, so that the same periodic movement continues when the original stimulus has been withdrawn, is one of the most wonderful of plant phenomena. "In the *Annals of Botany*, October 1902 (vol. vi. p. 245), we described a series of experiments on this subject. We remarked (p. 259) that 'Those who repeat our experiments must not expect uniform success, as there is undoubtedly a certain capriciousness in the results, which probably depends on varying degrees of vigour in the plants used.' The present research was begun in the hope of discovering a cause for this capriciousness; in this we have been disappointed; nevertheless, some of our results seem worth printing. The fundamental experiment consists in subjecting seedlings or growing shoots to a series of opposite stimuli following each other at equal intervals of time. The stimuli may be due to gravitation or to light; in either case they tend to produce curvatures in two opposite directions. It might be supposed that the result would be an absence of all curvature. But this is not so; what happens is that the plant curves first in one and then in the opposite direction . . . In our former experiments the reversal of the stimulus occurred at intervals of half an hour; we have now succeeded in building up a periodic movement in a fifteen-minute rhythm. That during the continuance of the alternate stimuli a plant should nutate in a given rhythm is sufficiently remarkable, but it is far more interesting that the rhythm should continue after all stimulation has ceased, and this we again find to be the case. We have again used the intermittent klinostat, employing, of course, a horizontal axis for geotropic experiments, and a vertical axis in the case of heliotropism . . . The act of rotation is rendered gentle by a fan-governor, so that the plant is not unduly jarred."

The subjects used in the experiments recorded are Mustard seedling (geotropism), cut stalks of a Valerian (geotropism), seedlings of *Phalaris canariensis* (heliotropism), and seedlings of Oat (heliotropism). Of *Phalaris*,

used on the quarter-hourly period, the authors write: "This experiment is remarkable as showing that the plant may acquire a rhythm in a very short time, *e.g.* after four periods of a quarter of an hour each." In the case of the Oak seedling, used for the half-hourly period, the authors explain that "We give this experiment in order to make it clear that there is no necessary connection between the heliotropism and the quarter-hourly period, and that a plant can acquire a half-hourly rhythm by alternating stimuli." Needless it is to say that all the experiments are of great interest, and in detail which cannot here be referred to. From under the head of "General Remarks" we may take the following paragraph: "All we can do is to compare our results with other periodic phenomena. For instance, when the stimulus is given by the alternation of day and night, we get the diurnal periodicity of sleeping plants, which, as in our experiments, continues after the stimulus has ceased. It seems to us that such natural rhythms, as well as our artificial phenomena, are intelligible only as modifications of a fundamental rhythmic faculty in plants. Such a faculty exists as circumnutation, and we may point out that the possibility of regulating artificially the rhythmic growth of a plant is in entire agreement with the fundamental idea of 'The Power of Movement in Plants,' namely that growth-curvatures are modifications of circumnutation."—*R. I. L.*

Riella, Development in the Genus. By Morten P. Porsild (*Flora*, vol. xcii., 1903, pp. 431–456; 8 cuts.—The starting-point of this work was the raising of a sp. *R. Paulsenii* in a sample of dried mud from the banks of a brackish pond in Bokhara brought back by the Danish Pamir Expedition. Several other species were studied. The early stages of germination take place well on wet filter-paper, but the plants here soon become abnormal; for continuous growth kaolin is the best substratum. The product is an erect multicellular "primordial lobe" (better "protothallus"), a flattened oval plate, on a narrow stem supported by numerous rhizoids. The upper part is of adult ("ausgewachsen") cells, and it is from the lower merismatic part that the stem proper arises; on its margin a vegetative point arises pushing aside the "lateral lobe," and forming on one side the stem and leaves, on the other the dorsal wing with the sexual organs, or two may arise symmetrically. A distinct apical cell is only formed later, and not at all in etiolated or weak plants; it lies between wing and stem, its segments going alternately to one and the other. The formation of reproductive organs may be very precocious. Gemmæ may arise from the margins of the plants; they are oval plates, with a pair of deep notches nearer to one end; the merismatic tissue from which the growing-point arises lies at the base of the larger lobe near the notch.—*M. H.*

Roadside Plantations, Contributions to the Study of. By N. Severi (*Bull. R. Soc. Tosc. Ort.* 11, p. 315; November 1903).—The paper has more particular reference to the plantations in the city of Rome. The author first mentions the *conditions which are unfavourable to the normal growth of such trees*; these are deficient composition of the soil due to the accumulation of building refuse; the presence of sub-

terranean constructions and drains; the huge network of gas-pipes and the frequent escapes of poisonous hydrogen gas; the natural humidity or dryness of the soil; the impermeability of the soil to aeration and moisture; want of light; solar reflection; want of sufficient air and space for the proper development of the branches; dust and impurity of the atmosphere arising from gases emanating from factories, &c. He then proceeds to discuss the *organic and constitutional diseases* of the trees. Plane-trees, on account of their rapid development, are greatly subject to disturbance of their organic functions; they predominate in the squares and roads of urban and suburban Rome.

Many of these trees, whose foliage had become chlorotic, were greatly benefited by the addition of sulphate of iron to the soil. The Paulownias in one square presented an anæmic condition, due to the lack of proper aeration of the roots, arising from compression of the soil around the trunks. The presence of too much lime in the soil is another harmful factor, as is also the absorption by the roots of hydrogen used in lighting, and of carburetted hydrogen escaping from pipes.

As regards the animal parasites attacking the trees, the two most important are *Scolytus destructor* and *Lithocolletis Platani*; the former attacked Elms, the latter Planes. *Cossus ligniperda* is another enemy which caused the loss of two Elm-trees in one place, and two specimens of *Salix babylonica* in another. *Galeruca ulmariensis*, as its name implies, is an enemy of Elms. *Bacillus amylobacter* attacks roots when the latter are deprived of air. There is no doubt that the damage suffered by Paulownias in the Piazza dell' Independenza is due to this parasite, after the ground has become impermeable to air. Of vegetable parasites the most harmful have been *Polyphorus abietinus* and *Rhizoctoma mori*. The first caused the death in June 1901 of a *Libocedrus decurrens*, and in September of the same year that of an *Abies pectinata*. The second of these two fungi was found on two dead trees of *Morus alba* in May 1900. Baillon attributes the origin of the disease to mutilations made in the sap-wood and bark of the tree, disturbing the proper circulation of the sap and thus causing decomposition.—*W. C. W.*

Robinia neomexicana × Pseudacacia (R. Holdtii Beissner). By E. Koehne (*Gartenflora*, 15/5/03, p. 272).—This reputed cross originated in Colorado, the seed-parent being *R. neomexicana*. It is said to be hardier than *R. Pseudacacia*, with thicker, darker leaves, and flesh-coloured flowers.—*J. P.*

Rock and Wall Gardening (*Gard. Mag.* No. 2606, p. 675; 10/10/03).—This article may be helpful to amateurs who are desirous of growing alpine plants in a small space. Directions are given how to make small rockeries, and how to build rough walls on which to grow plants.

W. G.

Root-buds, Investigations on Plants with. By M. Dubard (*Ann. Sc. Nat.* (*Bot.*) xvii. pp. 109–224, 4 figs. and 4 plates; 1903).—A useful paper on the life and growth of common wild plants. These include trees and shrubs, herbaceous perennials and biennials. The possible sources of stems are:—primary stem from the seed and buds on

this; stems from buds formed on the base of aerial stems, or on stolons, rhizomes or other underground stem-structures; stems from buds formed on roots. The latter form the chief topic, but the others come under notice. After a short summary of previous work, the author classifies his investigations into three main groups.

1. Herbaceous plants with dormant or accidental root-buds. In this class the root-buds are only slightly better than none at all; they are very rudimentary. Dormant root-buds are small protuberances on the roots, which only develop if the plant is severely injured, but they can be made to produce shoots by transplanting portions of detached roots; they occur in *Geranium sanguineum*, *Viola elatior*, *Plantago media*, *Euphorbia sylvatica*, *Alliaria officinalis*, &c. Accidental root-buds cannot be detected on the roots, but on mutilating the plant they develop and produce shoots; e.g. *Bryonia dioica*, *Lychnis dioica*, *Rubus cæsius*, &c. While the leafy shoots produced from root-buds of this group are in many respects like ordinary shoots, they differ in growth and internal structure, in the size, shape, and texture of the leaves, and in not bearing flowers. Their structure altogether is less developed than the normal, and in consequence the majority of them do not survive the winter.

2. Trees and shrubs with radical shoots. Under this class are included the radical shoots of trees whether their origin be root-buds (*e.g.* Poplars, English Elm, *Robinia*, &c.), or dormant buds or suckers (*e.g.* pedunculate Oak), or from stools (Oak and Black Poplar). Radical shoots are distinguished by exuberant growth, long internodes, and large leaves. The tendency, in short, is towards a more herbaceous mode of growth, and the more woody the normal stems of the species examined, the greater the difference, externally and internally, between ordinary branches and radical shoots. The Poplars (black, white, and aspen) are described in considerable detail, while many common trees are considered briefly.

3. Herbaceous plants with root-buds which normally produce shoots. All the plants of this group have root-buds, which in the natural course of growth produce flowering shoots. In Toadflax (*Linaria vulgaris*) the stem produced directly from the seed is sterile and soon dies; the later growth proceeds from radical buds, which alone produce flowering shoots. In external features and internal structure these radical shoots are more differentiated than the primary stem. The same holds good for *Euphorbia Cyparissias*, *Convolvulus arvensis*, and *Carduus arvensis*. In *Sonchus arvensis* the primary stem is fertile, also the stems from radical buds; in structure the primary and radical shoots are almost equal. In *Campanula rotundifolia* there are three kinds of stem—from the seed, from rhizomes, and from root-buds. *Hypericum perforatum* is similar except that it has shoots produced from suckers instead of rhizomes. In these cases the radical stems are intermediate between the primary, which is better developed, and the rhizome or sucker shoots, which are poorer.

The paper is provided with sectional summaries. The figures show variations in the leaves from different kinds of shoots, and the plates are excellent drawings of morphology and structure.—*W. G. S.*

Root-pruning. By J. S. U. (*Journ. Hort.* September 24, 1903, p. 279).—This is often neglected in orchards if the annual growth pre-

dominates. Root-pruning should be done in October whilst the soil is still warm. Advice as to the method is given.—*C. W. D.*

Roridula, Some recent Observations on the Biology of. By R. Marloth, Ph.D., M.A., with a figure of the flowering branch of *R. dentata* in the text (*Ann. Bot.* vol. xvii. No. lxv., p. 152; January 1903).—This is a very interesting contribution to our knowledge of insectivorous plants. The author points out that the two species of *Roridula* are the only shrubby representatives of the order *Droseraceæ* that are known. *R. dentata* grows to the height of 4 feet, while *R. Gorgonias* is a shrublet 12 to 15 inches high. In South Africa, in the districts where these plants grow, branches are suspended in the houses for the purpose of catching flies. The most remarkable points in this paper are in the statements that an insect required for the pollination of the flowers is proof against the secretion by which other insects are caught, and that a spider is equally proof against it and lives by stealing from the plant.

"When recently visiting one of the localities where *R. dentata* is known to grow, viz. the valley above the Tulbagh waterfall, I noticed a spider walking about on the bushes, and on examining the bushes more closely I found that the spiders were quite numerous. They were all of one kind, belonging to one genus, *Synæma* (Crab-spiders). Dr. Purcell, who kindly examined the specimens, is of the opinion that it is an undescribed species. The crab-spiders spin no web, but wait for their prey and pounce upon it whenever it comes near enough. This species had selected the *Roridula* for its residence, and was evidently quite at home there, for numerous little nests were hidden among the leaves, some of which were empty and serving only as hiding-places for the spiders, while others contained a large number of young spiders.

"The surprising feature of the matter was that the spiders were able to walk or run over the leaves without the slightest hindrance from the sticky secretion of the tentacles. Whenever an insect was caught by a leaf and began to hum or struggle, a spider in its neighbourhood would dart from its nest and secure the prey. Hence it is evident that the spider must be protected by some kind of varnish or grease against the sticky fluid, for neither their legs nor their bodies adhere to it in the slightest degree. Whether the same species of spider lives on any other plant is not known, but it has evidently adapted itself to the *Roridula*, and lives on the insect caught by the bush."

While studying the structure of the flowers the author noticed that the position of the anthers varied. He soon detected the cause of the different position, for on irritating the "connective of the stamen" he saw the anther swinging round with a jerk ejecting a little cloud of pollen. This proved that the stamens of *Roridula* are irritable.

He says: "This special contrivance showed that the fertilisation of these flowers must be effected by insects; but in spite of my watching the shrubs for about an hour, I did not observe any visitor. The difficulty of the case was to understand how an insect could be adapted to visiting these flowers, for how could it escape being caught by the leaves or calyx-lobes, unless it had learnt to avoid the danger in some special way?

"At last I found the solution of the problem, for I noticed a small

hemipterous insect walking out between the leaves. I succeeded in securing a few of these insects, which were evidently as proof against the sticky fluid as the spiders. They were kindly identified by Dr. Purcell and Mr. Mally as a species of Capsids, apparently undescribed.

"Summing up these observations, we find that the *Roridula* catches insects in order to obtain an additional food supply, but that a spider robs the plant of a share of its prey in spite of its sticky tentacles."

Cultivators who may have the opportunity of growing *Roridula* will be interested to know that *R. dentata* was found by Dr. Marloth on the dry slope of a hill, which consisted of a hard iron gravel and clay. It is a mistake to suppose that all Droseraceous plants are fond of *sphagnum* and excessive moisture. *Drosophyllum lusitanicum*, another sub-shrubby representative of the order, attaining the height of about a foot, does best in sandy loam, indeed the best plants I have ever seen were seedlings that had the treatment of ordinary herbaceous plants, grown from seed in a frame.—*R. I. L.*

Rosa Pernetiana 'Soleil d'Or,' apropos of (*Bull. R. Soc. Tosc. Ort.* 10, p. 288; October 1903.)—It was obtained by Monsieur Pernet Ducher, of Lyons, as a hybrid from *Rosa lutea plena* (Persian Yellow), fertilised by the hybrid 'Antoine Ducher.' It is one of the best perpetual-flowering varieties. The flowers are large and of a beautiful apricot-pink on a yellow ground, and are very sweet. It is highly recommendable both on account of its robust growth and its flowering value. The author has made numerous unsuccessful attempts to fertilise it with many other varieties. But with its pollen he succeeded in fertilising the variety 'Aquila,' largely used by gardeners for winter forcing. A few seeds formed in autumn from which in spring appeared a small plant having a habit and foliage closely resembling the 'Soleil d'Or.' But, being attacked by disease, it died. The author complains that experiments in cross fertilisation are sadly neglected in Italy, as compared with France, England, and America.—*W. C. W.*

Roses for Autumn, Crimson and Scarlet (*Gard.* p. 335; 14/11/03).—Valuable as bright-coloured Roses are in summer, they are particularly so in autumn. The list of really excellent varieties for massing is comparatively small, so far as the bright-coloured ones are concerned. For a bold bed there is none to compare with 'Gruss an Teplitz.'—*E. T. C.*

Roses, Polyantha. By Courtenay Page (*Gard.* p. 413; 12/12/03).—There is probably no class of Roses worthy of greater attention than the dwarf-growing Polyanthas. They are truly perpetual-flowering, coming into bloom early in June and continuing until November. They are fairly hardy and quite easy to grow. When pruning, where very dwarf bushes are required, it is only necessary to thin out the useless wood and cut back the strong growths. The best varieties are given.

E. T. C.

Rose, Various Plants bearing the name of. By R. P. Brotherston (*Gard. Chron.* No. 862, p. 1; July 4, 1903).—The author in this

article gives some remarks on the plants which bear, or have borne, the name of Rose, with much interesting information as to the derivation of the name which will prove very useful to lovers of plant-lore.—*G. S. S.*

Rubus moluccanus (*Die Gart.* p. 431, June 6, 1903).—This species inhabits the Himalaya, Burma, &c. Being very variable in its foliage, it is known under several names, mostly *R. reflexus*, but its proper specific name is *R. moluccanus*. In general appearance it resembles a climbing or trailing Begonia. The stem and leaf-stalk are covered with brownish hairs. The palmate leaves are nine inches long and broad, slightly dentate; the central part is dark green while the margin is of a much paler green, and pilose beneath. It is a fine plant for the temperate house.—*G. R.*

Salt-Marshes of the Bay of Fundy, An Ecological Study (with 16 figs. and maps). By W. F. Ganong (*Bot. Gaz.* vol. xxxvi. No. 3, p. 161; No. 4, p. 280; No. 5, p. 349).—In this paper the author deals with the Distribution and extent of the Marshes, their Geological origin, their mode of formation, of reclaiming soil, &c.: but "no attempt has been made to prepare a flora of the Marshes." He, however, gives a brief classification (p. 349) with *Halophytic* or the wild salt-marsh formation, of *Spartina stricta*, or 'Sedge association,' *Salicornia-Suæda*, or Samphire, &c., and *Statice-Spartina juncea*, or Fox-grass, &c. Secondly, *Mesophytic* or Reclaimed salt-marsh formation (*i.e.* Meadow formation). Thirdly, *Hydrophytic*, including *Wet-marsh*, *Bog*, *Water-margin*, and *Swamp* formation.—*G. H.*

San José Scale. By C. L. Marlett (*Yearbook U.S. Dep. Agr.* 1902, p. 155).—This well-known pest, so called from the place in California where it was first discovered, has become prevalent in America in the last thirty years, and is most destructive to Apples and Pears and other deciduous fruits. If unchecked it ruins the tree in two or three years, but may be kept in check by spraying the tree with lime-sulphur-salt. Most European States, England excepted, have prohibited the introduction of American fruit except under strict regulations, but the restrictions have proved unavailing or unnecessary. The alarm first caused by it in America is subsiding, owing to the efficacy of the 'California wash' for spraying the affected trees.

This scale is now well known in Japan, where it is a recent introduction. Exhaustive investigations, however, prove that the San José Scale is indigenous, not to America, but to China, from which it was introduced by plants brought to California about thirty years ago. The scale is kept in check in Asia by a natural enemy, the Chinese lady-bird (*Chilocorus similis*) which feeds upon it. Experiments are being made by the introduction of the insect into America, but it is too early to speak of results. The history and spread of the pest are minutely described, with illustrations.—*C. W. D.*

Saxifraga, Early-flowering Species. By A. Purpus (*Die Gart.* p. 433, June 13, 1903).—An illustrated article describing all the best early spring-flowering Saxifragas. *S. Burseriana*, from the Dolomites, is

one of the best, opening its pure white blossoms as early as February, and whether grown in full sunshine or in shade on the rockery is quite immaterial, as it will thrive in almost any position. *S. apiculata*, still by many wrongly called *S. Malyi* or *S. scardica*, with pale yellow flowers, is also one of the earliest. *S. Salmoni*, a hybrid between *S. Burseriana* and *S. Rocheliana*, is a most desirable plant, and is as early as *S. apiculata*. It grows fairly quickly, and blooms freely with white flowers as large as *S. Burseriana*. *S. Kotschyi* is an elegant plant, but more so in foliage than in the somewhat inconspicuous yellowish flowers. *S. scardica*, from the Scardus in Greece, is rarely supplied true, but instead *S. apiculata*, which it hardly resembles, is sent. The leaves are small, green, covered with calcareous spots. It is one of the most distinct and attractive of the whole genus. *S. Rocheliana* and its variety *caryophylla* are two very pretty plants with small rosettes and handsome white flowers. *S. marginata* is a miniature species with pretty encrustated rosettes. The flowers are rather large, pure white at first, changing to rose later on. A most delightful alpine, but, being rarely sold true, it is anything but common in gardens. *S. juniperiana* and *S. sancta* closely resemble each other, having small yellow flowers and small pointed leaves. *S. oppositifolia* is represented in gardens by several forms. All are most attractive, having large lilac, rosy-purple, or white flowers; and the evergreen plants grow rapidly, soon forming large patches.—*G. R.*

Scrophulariaceæ, Stamen Structure in. By Ph. van Tieghem (*Ann. Sc. Nat.* (*Bot.*) xvii. pp. 363–371; 1903).—The base-plan of the stamen of this order is that with four pollen-sacs (*tetrathèque*), as is the case in most of the genera. The author describes two modifications with two pollen-sacs (*dithèque*). The one has half of the anther abortive, and consists of two longitudinal pollen-sacs placed asymmetrically on one side of the connective. In the other the anther with two pollen-sacs occupies the summit of the filament; this is said to be due to an originally asymmetrical anther becoming displaced towards the summit.—*W. G. S.*

Scum on Ponds. Anon. (*Gard. Chron.* No. 863, p. 22; July 11, 1903).—Various methods have been tried, with more or less success, to remove the confervoid and other vegetable growths which so often disfigure the water in small ornamental ponds, but none have hitherto proved satisfactory. Spraying the surface of the water with Bordeaux mixture has now been found to effect the purpose in the most complete manner. A pond in the Michigan Agricultural College was sprayed with this mixture, and it was found that in twenty-four hours every vestige of the green scum had disappeared, and at the end of another day it had all sunk to the bottom. The fish and frogs in the ponds were not injured in any way, but the mosquito grubs were materially checked. The spraying had to be repeated in the course of a month. The Water-lilies were not injured, but it is suggested that experiments should be made to find the proper strength to use, in ponds containing many kinds of water-plants.

G. S. S.

Seaside Gardening. Anon. (*Gard. Chron.* No. 868, p. 109, Aug. 15, 1903, & No. 869, p. 135, Aug. 22, 1903).—"The aim of this article is

to indicate the means of making the shores of our marine resorts gay with flowers or attractive by well-arranged and contrasted foliage during the summer or early autumn." Various plants particularly adapted for this purpose are then mentioned, and the best means of cultivating them. This article should be of great use to all who are trying to grow plants by the seaside.—*G. S. S.*

Sedum Stahlii. By W. B. Hemsley (*Bot. Mag.* tab. 7908).—Nat. ord. *Crassulaceæ*. Native of Mexico. This is a trailing, much-branched, succulent herb. Leaves ovoid, falling early and forming a bud, giving rise to an independent plant. Flowers yellow, 6–9 lines across.—*G. H.*

Seed, Selection of, for Producing and Fixing New Varieties. By Jules Rudolph (*Rev. Hort.* August 1, 1903, pp. 360–1, and September 1, 1903, pp. 410–11).—Interesting article on method of acquiring extra early or late or hardier varieties of flowers and vegetables, and fixing such peculiarities.—*C. T. D.*

Seeds, How to assist the Germination of. By Henri Theulier fils (*Rev. Hort.* June 1, 1903, pp. 268–9).—Some interesting remarks regarding the employment of chlorine, camphor, iodine, and bromine in solution. The seeds being steeped therein for a time before sowing, germination commences much earlier, and some seeds germinate which otherwise could not be induced to do so. The chlorine is used in the proportion of 3 grammes to 1 litre of water. The seeds are soaked in water for ten hours, then placed in the sun in the aqueous chlorine solution for six hours. They are then dried on a cloth, mixed with a little sand or fine soil, and sown in the usual manner, then being watered with the water which passed through the cloth. With camphor, 1 gramme is dissolved in a few grammes of alcohol, and this solution poured into 2 litres of water. The camphor being dissociated renders the water cloudy, and in this the seeds are soaked for eight hours, the same water being subsequently used for watering the resulting plants—a few centilitres at first, and then more, a quarter litre sufficing to bring the plants to adult size. It is observed that all substances which readily part with their oxygen can be successfully employed to like purpose, provided they be properly diluted, such as red lead, nitric, sulphuric, and hydrochloric acids, also oxygenated water if in weak doses. Weak negative electric currents, according to Davy and Becquerel, also hasten germination, while positive currents produce no effect.—*C. T. D.*

Seed Selection: Improvement of Cotton. By Herbert J. Webber (*Yearbook U.S. Dep. Agr.* 1902, p. 365).—This article has special reference to cotton, but the remarks in it apply by analogy to the exercise of selection in other crops. Now that the area of cotton cultivation in the world is likely to increase, the introduction of the best varieties is important. Some growers collect seed at random and sow all they can get, but it is recommended to go over the field when in bearing, when it may be noticed what endless variations are to be found. It is advised to select for one special feature at a time. Abundance of production, earliness of ripening, size of pods, power of resisting storms or disease

should all be taken into account. Many specimens of variation are given by way of illustration.—*C. W. D.*

Seeds, How Plants scatter their. By W. C. Worsdell (*Gard. Chron.* No. 865, p. 55 ; July 26, 1303 ; cont. No. 866, p. 86, & No. 867, p. 101).—The author in this paper gives a very interesting account of the different ways in which various plants are enabled to scatter their seeds, a process which is so necessary in preserving the life of a species, and describes the formation of certain seed-vessels which, when shaken by the wind, scatter their seeds to some considerable distance. Some seeds, by reason of their small size and lightness, are carried long distances by the wind ; others have wings or other appendages which enable them to be transported afar by the same agency. Some seed-vessels, when their contents are ripe, burst open suddenly and with much force, scattering their seeds in all directions. Many other contrivances are mentioned for the dispersal of seed, among them the various ways in which they are carried by animals.

G. S. S.

Seeds, Tests of Vitality of Vegetable. By E. H. Jenkins (*U.S.A. Exp. Stn. Conn., Rep.* 1902, pp. 424–431).—Results are given of the tests of vegetable seeds for several years past tabulated, so that the comparative viability of seeds of various ages may be easily seen. The results show usually but not universally a gradual diminution in the number of living seeds, demonstrating that other factors play a part in causing mortality among seeds as well as age. More Onion seed was tested than any other kind, and the average percentage of germination dropped from 76·5 for one-year-old seed to 21·9 for three-year-old.—*F. J. C.*

Seeds, Transport of Delicate (*Rev. Hort.* October 16, 1903, p. 467).—The Direction of Agriculture at Madagascar sent seeds of *Hevea brasiliensis* from Colombo, in layers in cocoa-nut fibre, in cocoa-nut fibre dust, and in charcoal powder ; and after a month's journey, of those in cocoa-nut fibre, just damped only, not wet, 80 per cent. germinated, as against about 60 per cent. in dust, and about 50 per cent. in charcoal, the last germinating much more slowly, and the resulting plants less vigorous.

C. T. D.

Seeds, Vegetable: Age for Sowing (*Rev. Hort.* July 1, 1903, p. 304).—M. Georges Bellair, in a report on the Horticultural Congress at Paris, says that M. Grosdemange presented a paper on the advantage in many cases of sowing seeds several years old in preference to new ones ; as, for instance, Carrots 2 years, less foliage, roots better colour ; Endive 3 or 4 years, to prevent too early seeding ; Spring Cabbage 2 to 3 years, for same reason, &c. His observations were confirmed by several authorities, with the general deduction that new seeds were best for free foliation, while with heart forming Cabbages, Salads, Melons, and Cucumbers, seeds 2 to 3 years old are preferable. Old seeds are also thought by M. Bazin to form a favourable factor in doubling flowers, and M. Opoix cited confirmative instances in *Dianthus*.—*C. T. D.*

Senecio clivorum. By Sir J. D. Hooker (*Bot. Mag.* tab. 7902).—Nat. ord. *Compositæ*, tribe *Senecionidæ*. Native of China and Japan. It

is the handsomest of all the herbaceous species, being 4–5 feet high, and remarkable for the very rigid red-purple pappus. The ray-florets have five filaments, the flower-heads being 3–4 inches across, orange, with exserted dark brown anthers.—*G. H.*

Senecio tanguticus. By Sir J. D. Hooker (*Bot. Mag.* tab. 7912). Nat. ord. *Compositæ*, tribe *Senecionidæ*. Native of Western China. This is a tall herbaceous plant from 6–7 feet high, with yellow heads in many-flowered pyramidal panicles, the ray-florets being only three or four.

G. H.

Shade Trees. By W. A. Murrill (*U.S.A. Exp. Stn. Cornell Univ., Bull.* 205; 9/1902; 4 plates, 25 figs.).—Brief notes are given on the trees of various European and American cities, with interesting details of the number of trees and of their condition. The trees of London meet with considerable commendation. The author points out the various sources of injury to which town trees are open, and gives a list of qualities desirable in trees for street planting. They should possess endurance, immunity from insect and fungal attacks, beauty and adaptability of form, shade production, cleanliness, and longevity. The special characteristics of a large number of trees are next described. His selection for city planting is as follows: *Quercus rubra* L., *Q. palustris* Du Roi, *Q. coccinea* Wangenh., *Q. velutina* Lam., *Q. imbricata* Michx., *Q. Phellos* L., *Platanus orientalis* L., *P. occidentalis* L., *Ailanthus glandulosa* Desf., *Acer platanoides* L. The remainder of the forty-eight pages is occupied with instructions as to the planting, caring, protection, and pruning of the trees. An excellent and useful pamphlet on an important subject.—*F. J. C.*

Sideroxylon Randii. By Spencer Moore (*Journ. Bot.* 492, pp. 402–3; 12/1903).—Description of a new shrubby species from the Witwatersrand, Johannesburg, collected by Dr. Rand.—*G. S. B.*

Siebert, Augustus (*Die Gart.* p. 601, September 19, 1903).—A short biography of this famous landscape gardener, creator and successful manager of the Palmen-Garten at Frankfurt-on-Main. He was able, not only to create by private enterprise a public establishment similar to the Crystal Palace (only on a smaller scale), but also made it pay and go on developing and improving from year to year while nearly all similar establishments have either degenerated or have had to close their doors.

G. R.

Smut and Bunt on Cereals, Experiments in Combating. By O. Kirchner (*Nat. Zeit. Land-Forst.* i. pp. 465–473; 1903).—Experiments with various fungicides for treating seed-grain of wheat show that hot water (54°–57° C.) gives the best result. Where this cannot be effectively carried out, a 1 p. c. solution of formalin may be used; both methods almost exterminated bunt (*Tilletia*), while untreated seed gave a crop which was badly infected. Experiments with Rye with sheath smut (*Urocystis occulta*) showed that any good fungicide will suppress the smut. In regard to Barley and Oat smut (*Ustilago*), the treatment of seed-corn with formalin was not effective.—*W. G. S.*

Soils, Their Requirements and Improvements. By Dr. H. J. Wheeler (*U.S.A. St. Bd. Agr. New Jersey, Rep.* 1902–3, pp. 128–158).—In this excellent and practical discourse the need of considering the physical as well as the chemical composition of the soil is shown. The author considers that farmyard manure, if properly treated, is, except for its deficiency in phosphoric acid, an ideal manure, but that since this commodity is frequently scarce, recourse has to be had to artificial fertilisers. The best forms and proportions in which to apply these are pointed out, and the great value of lime as a corrective to acidity in soils, with all the evils that follow from an acid soil, is pointed out. The one drawback to an alkaline condition of the soil (caused frequently by the presence of ammonia set free from farmyard manure) is, as was first pointed out in 1891 in a Rhode Island bulletin, that the Potato scab fungus grows best in an alkaline medium, and an attack of this disease, therefore, frequently follows the application of farmyard manure. The whole paper, which is too long for an adequate review here, is worthy of careful attention.—*F. J. C.*

Soil, Sterilisation of. By A. Smith (*Gard. Chron.* No. 885, p. 410, Dec. 12, 1903).—It is mentioned that " there are few, if any, large market gardeners and florists in the United States who do not now sterilise all the soil used in the benches and beds of their greenhouses," and a description is given of the apparatus used for this purpose. It consists mainly of perforated tubes round which the soil is placed and through which steam is passed, raising the temperature of the soil to 210° Fahr. in about twenty minutes. If this can be done economically, various pests should soon be stamped out.—*G. S. S.*

Soils we cultivate. By J. J. Willis (*Gard. Mag.* No. 2594, p. 475; 18/7/03).—A series of excellent articles on a subject most important to gardeners, the wearing out of soils, the necessity of manuring, and the results of the experiments carried out at Rothamsted are dealt with.

W. G.

Solanum ciliatum. By Ed. André (*Rev. Hort.* November 1, 1903, p. 500; coloured plate).—Bears large crimson Tomato-like berries throughout the winter; fruits as large as Mandarin Oranges. Highly recommended for decoration of conservatories. Native of Brazil.

C. T. D.

Solanum Commersoni. Anon. (*Bull. R. Soc. Tosc. Ort.*, 9, p. 277; September 1903).—Described as a new Potato by the Director of the Colonial Institute of Marseilles. It hails from Uruguay. It has been cultivated for some years in France. It is adapted to growth in a low marshy soil, does not mind frost, and yields successive crops from the same bed without need of replanting. Its cultivation is of the simplest kind, the soil only requiring to be dug over in spring. The edible aerial parts of the plant are abundant and furnish a green fodder, the supply of which is continued until the cold weather. The production of tubers is uninfluenced by the removal of the aerial parts. They are as yet only partially perfected and are not yet fit for human consumption, being too

bitter, but animals are fond of them. They keep well, not being subject to rot.—*W. C. W.*

Solomon's Seal (*Journ. Hort.* September 17, 1903, p. 265).—This is recommended as an excellent subject for early cultivation in the greenhouse and conservatory. Besides its ornamental qualities, the flowers are very fragrant.—*C. W. D.*

Soot Fungi on Cultivated Plants in German East Africa, Some injurious. By P. Hennings (*Not. König. Bot. Berlin, Bd. IV.*, pp. 80–82; August 30, 1903).—Short notes on certain new *Perisporiaceæ* and *Capnodiaceæ*, viz. *Limacinia tangensis* Henn. on Mangos, Palms, &c.; *Zukalia Stuhlmanniana* Henn. on *Cocos*, *Phœnix*, and *Zingiberaceæ*; *Pleomoliola Hyphænes* Henn. on *Hyphæne*; and *Asterina Stuhlmanni* Henn. on Pineapples.—*H. M. W.*

Sorghum Poisoning (*Sorghum vulgare*) (*Qu. Agr. Journ.* xiii. p. 59, July 1903; xiii. p. 93, Aug. 1903).—Sorghum has been grown for many years for fodder purposes, and frequent deaths are reported to have occurred amongst dairy stock, attributed to this cause. In 1902 Mr. Henry Tryon stated that he had discovered that the plant in question, during a certain period of its growth, naturally contains prussic or hydrocyanic acid. This question has since been investigated by Dr. W. Maxwell, Director of the Queensland Sugar Bureau, and he has proved incontestably that Sorghums, Millets, Amber-cane, Kaffir Corn, Maize, &c. all contain the poison from the earliest stages up to the ripening of the seed. In Egypt it is well known to the Arabs that the green portions of the young plant, known as 'Dhurra,' are poisonous, and during this period the plantations are protected in order to prevent cattle from feeding on the immature growth. The poison is most intense when young plants, 1 foot high, or less, are kept without water for a long time. Here follow descriptions of the experiments, their chemical relations and nomenclature with final observations on "The Cyanogenetic Constituents of Plants."

M. C. C.

Sorghum Poisoning. By Dr. Maxwell (*Qu. Agr. Journ.* xiii. p. 473, Nov. 1903).—In further experiments one series of plantings was allowed to grow without any special manurial assistance, and another series was manured with nitrate of soda. The experiment was made in order to see if the supply of additional nitrogen to the soil affected the amount of prussic acid incorporated in the growing plant. The results, according to repeated analyses, have shown that the supply of available nitrogen increases the amount of poison that the Sorghum and other plants are capable of making and storing up within their composition. These facts fully bear out the statement that Sorghum and similar plants, when grown on rich soils, would be more liable to contain highly dangerous amounts of the poison than when grown on soils poor in nitrogen. Prussic acid has been found in quantities varying from a mere trace up to the danger point. So far, however, only *Panicum muticum* comes anywhere near the Sorghum plant in the dangerous content of the poison, and several, including Sugar-cane and *Paspalum*, so far as they have been tested, being completely free from prussic acid.—*M. C. C.*

Sparaxis pulcherrima. By J. Day (*Gard. Mag.* No. 2608, p. 704; 24/10/03).—The successful cultivation of this beautiful South African bulb is the exception rather than the rule, and the writer of these notes describes in detail his method of growing it well. He writes from Wigtownshire, where the climate is mild and probably especially suitable to the requirements of this capricious plant.—*W. G.*

Sphærocodon obtusifolium. By W. B. Hemsley (*Bot. Mag.* tab. 7925).—Nat. ord. *Asclepiadaceæ*, tribe *Marsdenieæ*. Native of Tropical Africa. It is dwarf and sub-erect in wild state, but is a partial climber under cultivation. Stems 1–3 feet long; leaves oval. Flowers 6–8 lines in diam., purple-red.—*G. H.*

Spores, Formation of the, in the sporangia of *Rhizopus nigricans.* **and of** *Phycomyces nitens.* By Deane B. Swingle (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 37; June 1903, with 6 plates).—The essential processes in the formation of spores are thus summarised:

1. Streaming of cytoplasm nuclei and vacuoles up the sporangiophore, and out toward the periphery, forming a dense layer next the sporangium-wall, and a less dense region in the interior, both containing nuclei.

2. Formation of a layer of comparatively large, round vacuoles in the denser plasma, parallel to its inner surface.

3. Extension of these vacuoles by flattening, so that they face to form a curved cleft in the denser plasma; and, in *Rhizopus*, the cutting upward of a circular surface furrow from the base of the sporangium to meet the cleft formed by these vacuoles, thus cleaving out the columella.

4. Division of the sporoplasm into spores; in *Rhizopus* by furrows pushing progressively inward from the surface and outward from the columellar cleft, both systems branching, curving, and intersecting, to form multinucleated bits of protoplasm, surrounded only by plasma-membranes and separated by spaces filled with cell sap only; in *Phycomyces*, by angles forming in certain vacuoles containing a stainable substance, and continuing outward into the spore-plasm as furrows, aided by other furrows from the columella cleft and dividing the protoplasm into bits, homologous with and similar to those in *Rhizopus*, and separated by furrows partly filled with the contents of the vacuoles that assist in the cleavage.

5. Formation of walls about the spores and columella, and, in the case of *Rhizopus*, the secretion of an intersporal slime.

6. Partial disintegration of the nuclei in the columella.—*M. C. C.*

Spraying, Directions and Formulæ for (*Trans. Ill. Hort. Soc.* 1902, p. 7).—Some useful directions as to the materials, preparation and application, and the judgment necessary to carry out spraying in a thorough manner. Some excellent recipes for five, fifty, and one hundred gallons of the various washes are included.—*E. F. H.*

Spraying Orchards (*Journ. Hort.* June 11, 1903, p. 514).—The Canadian Department of Agriculture have recently given a series of practical demonstrations, in the provinces of Ontario and Quebec, to show how spraying may be most easily effected.—*C. W. D.*

Spruce, A Giant (*Journ. Hort.* August 6, 1903, p. 123).—One felled to exhibit at the "World's Fair" in Oregon was 300 ft. high and 40 ft. round. Its age was estimated at 440 years. It is said to have been an "Aberdeen" Spruce, but if the age given is correct it must have been a native Spruce.—*C. W. D.*

Stigmonose, a Disease of Carnations and other Pinks. By A. F. Woods (*U.S.A. Dep. Agr. Div. of Pathology, Bull.* 19, 1900; 3 plates, 5 figs.).—The author states that the disease of Carnations commonly attributed to bacteria, and known as "bacteriosis," is a condition induced by the punctures of insects, principally aphides and thrips, and of mites; and further that the changes involved are dependent to a large degree on the condition of the plant and the time the punctures are made. The disease is characterised by the appearance of small, pellucid dots, irregularly scattered through the leaf, seen when the fully-grown but young leaves are held against a strong light, and sometimes having a yellowish centre. Later the dots become pronounced, and whitish or reddish sunken spots appear in the leaf. The author supports his statements by many apparently conclusive experiments, and examines the results obtained by previous workers. He recommends the proper selection of cuttings, careful propagation of stock, good soil, proper amount of moisture, light, and air; reduction of number of aphides &c. to a minimum by timely fumigation and syringing.—*F. J. C.*

Stock and Scion, Influence of the Former on the Latter. Anon. (*Gard. Chron.* No. 855, p. 312; May 16, 1903).—Some very interesting experiments have been made by M. Leclerc du Sablon on this subject, which he has communicated to the Academy of Sciences. It appears from his investigations that the reserve matter accumulated in the stem during the resting period is greater when the Pear is grafted on the Quince than if grafted on another Pear, on account of the roots of the Quince containing less reserve material than those of the Pear, so that the stems remain richer in nutritive matter in consequence, and the latter, being nearer to the fruit, is more easily assimilated by it. Experiments are being made with other plants with a view of confirming the results already arrived at in the case of the Pear.—*G. S. S.*

Strawberries and Salicylic Acid. By L. Portes and A. Desmoulières (*Ann. Agr.* p. 112; Feb. 1902).—By the violet coloration on the addition of perchloride of iron, salicylic acid has been found chiefly in Wood Strawberries, four season, 'Paxton,' 'Héricart,' 'Jugonda,' and 'Brest.'—*C. H. H.*

Strawberries, Fertilisers for (*U.S.A. Exp. Stn. Rhode I., Rep.* 1902, pp. 247–252).—The results of experiments extending over two years tend to show that sulphate of ammonia, and sulphate of potash are the best forms of nitrogen and potash respectively to apply for Strawberries.

F. J. C.

Strawberries: Retardation under Blue Glass (*Rev. Hort.* October 1, 1903, pp. 444–5).—M. Camille Flammarion reports results of

experiments, mainly with regard to Strawberries, which he summarises thus: "Frames glazed with blue glass and shaded preserve the ripe fruits placed within them for about a fortnight longer than under white glass, and the ripening of full-sized berries can also be retarded for ten or eleven days in the usual way. For retarding vegetative growth, however, the frames are useless, the plants becoming etiolated."—*C. T. D.*

Streptopogon, Wils.: A Monograph of the Genus. By Ernest S. Salmon, F.L.S. (*Ann. Bot.* xvii. No. lxv. p. 107, January 1903; with plates viii., ix., x.).—Few of our readers probably are interested in exotic muscology, but this is an important monograph and a valuable dissertation on a genus which evidently required to be placed in order. It comes near to *Tortula*; the headquarters of the genus is in the Andes of Ecuador and Colombia, whence the species spread north to Mexico and south to Brazil, but there is the remarkable fact of the occurrence of two species in Madagascar.—*R. I. L.*

Sugar Beet, Composition of the. By Harvey W. Wiley (*U.S.A. Dept. Agr. Bur. Chem., Bull.* 74, 1903.)—A comparison of data afforded by a series of experiments with regard to the influence of environment on the composition of the Sugar Beet, conducted in collaboration at many different stations, viz. Washington, Indiana, Iowa, Kentucky, Michigan, New York (Geneva), Cornell (Ithaca), Utah, Virginia, and Wisconsin.

The data collected from these experiments is shown in a series of three charts.

Number 1 shows the percentage of sugar in the Beet, the latitude of the station, and the sunshine record. In general, the latitude follows the sugar content. The percentage of sunshine seems to have but little effect upon the latter.

Number 2 shows the percentage of sugar in the Beet, the purity of the juice, the temperature and the average length of day at the station. It is interesting to note from this chart that the percentage of sugar in the Beet increases with the length of the day.

Number 3 shows the percentage of sugar in the Beet, the altitude of the station, and the rainfall record.

A striking effect of environment on the composition of the Beet is shown here in the increased sugar content connected with the rise of altitude at the Blacksburg station. But this effect can only be taken in connection with other features of environment, such as extensive plateaus, &c., as altitude does not in every case mean the increase of sugar content. With regard to rainfall, so long as the Beet has a sufficient supply of water, it does not seem sensitive to slight variations.—*C. H. C.*

Sugar-Beet, Observations on the Cultivation of. By M. M. Berthault and Brétignière (*Ann. Agr.* pp. 30–56 and 65–102; Jan.–Feb. 1902). A paper of considerable length which should be consulted *en bloc*.

C. H. H.

Sugar-cane Culture in Spain. By C. Sprenger (*Bull. R. Soc. Tosc. Ort.* 11, p. 329; November 1903).—The production is larger than the consumption. In Malaga are 21 large factories, and 10 smaller ones.

The cane-fields are the largest in Europe ; they are replanted from March to May. After 6–8 years the plantations should be renewed, and the same fields occupied for a series of years with other cultures. Weeding is only necessary during the first year, *i.e.* before the canes entirely cover the ground. Copious water is given eight or ten times during the summer, and the fields are richly manured with guano, and sulphate and nitrate of soda. The canes are gathered in April and May, and the leaves afford fodder for animals. Much *Sorghum saccharatum* is also grown, and is cut in autumn. The cane-fields are very picturesque.—*W. C. W.*

Sugar-cane Culture in the South-East, for the Manufacture of Table Syrup. By H. W. Wiley (*U.S.A. Dept. Agr. Bur. Chem., Bull.* 75, 1903).—In the first part of this pamphlet the results of fertiliser experiments on Sugar-cane are considered.

Two different fields were treated, A having been in cultivation about twenty years, and B about five or six years. The latter, moreover, had had a very heavy crop of velvet beans ploughed under the preceding autumn.

The character of the canes from field B was good, but their purity and sugar content were not as high as in those from the less fertile field A. It is to be inferred that the large excess of nitrogenous matter in the soil of B, while tending to produce a large crop, also tends to diminish the excellence and purity of the product.

Both cases showed that two applications of the fertiliser used are preferable to one ; also that nitrate of soda seems to be a more satisfactory source of nitrogen than either cotton-seed or cotton-seed meal, and that it should be added in small quantities at a time, at rather frequent intervals, to prevent loss from heavy rains.

The second part of the bulletin deals with reports of special agents on Sugar-cane culture.

The manufacture of syrup of some kind is carried on throughout the States, with the exception of Alaska, whether from Sugar-cane or Maple, Sorghum or Maize.

In Georgia especially the industry has largely increased. The experiments were intended to show the quality of the canes as sent direct to the factories for commercial purposes, not merely the results from specially chosen canes, which would naturally be higher in every respect.

It was found that the canes, while equalling those of Louisiana in sugar content, have a shorter manufacturing season (*i.e.* in Georgia, Alabama, Florida, and Mississippi), together with a higher quantity of reducing sugar which, while it lessens their value for sugar-making, renders them if anything superior for syrup manufacture, as this sugar is quite as sweet and palatable as sucrose, and crystallises less easily.

C. H. C.

Sugar-cane Soils of Jamaica. By H. H. Cousins (*Bull. Dep. Agr. Jam.* vol. i. pts. 4, 5, pp. 76, 97).—These contain analyses of soils from the various districts in Jamaica.—*G. H.*

Sweet Peas, Hybridising (*Gard. Mag.* No. 2594, p. 486; 18/7/03). —Diagrams of the flowers illustrate the organs of fertilisation, and the instructions given for artificial fertilisation are simple and clear.—*W. G.*

Syngenesis of Anthers of Compositæ: Connation or Agglutination? By A. Tschirsch (*Flora*, vol. xciii., 1904, pp. 57–85, t. ii.).—The anthers are united by an interrupted agglutination where they touch. The union may be so complete as to form an apparently simple "ligament."—*M. H.*

Syringa, The Genus. By K. K. Schneider (*Wien. Ill. Gart.-Zeit.*, Heft 3, 1903, pp. 99–109).—What is the Persian Lilac? This is a question which the author has essayed to solve in a review of the genus *Syringa*. Everyone who knows this beautiful spring-flowering shrub by name naturally supposes that being called the Persian Lilac, it, of course, originally came from Persia. But not a scrap of evidence is forthcoming to show that it has ever been seen wild in Persia, or even in any of the surrounding countries; and no one can say with certainty whence it originated. From notices of it from time to time by pre-Linnæan botanists, it is ascertained that the Persian Lilac has been in cultivation in Europe ever since the latter part of the fifteenth century, so that it ranks among the oldest of cultivated plants in the gardens of the present day. Now, it has long been observed that *Syringa persica* does not produce perfect pollen and seldom ripens seeds; that seed is produced only when the stigma is dusted with the pollen of the common Lilac, *S. vulgaris*, and consequently the few seedlings that have been raised from *S. persica* are hybrids. This sterility of *S. persica* combined with other circumstances enumerated by Herr Schneider has led him to conclude that it is a "Kulturprodukt," most probably a hybrid derived from *S. vulgaris* and *S. afghanica*, a species discovered by the late Dr. Aitchison in Afghanistan and since known to spread far eastwards into Central Asia. That *S. vulgaris* is one parent may, I think, be assumed with much certainty, but the participation of *S. afghanica* in the parentage seems to require more direct evidence. *A. H. K.*

Tacsonia manicata. By Ed. André (*Rev. Hort.* Aug. 1, 1903, pp. 356–7; coloured plate).—A very pretty *Tacsonia* with brilliant scarlet flowers, and by the description suitable for outdoor culture in mild climates; resents warm-house treatment, and thrives but moderately in the temperate house; stands several degrees of frost. Native habitat Ecuador, 10,000 to 12,000 feet above sea-level.—*C. T. D.*

Taxodium, On the Gametophytes and Embryo of. By W. C. Coker (*Bot. Gaz.* vol. xxxvi. Nos. 1, 2, pp. 1, 114, plts. i.–xi.).—The author discusses in detail the structure and development of the staminate cone, the pollen-tube, the ovulate cone, the megaspore, the large-celled tissue or tapetum, the development of the prothallium and of the archegonia. The formation of the ventral canal nucleus, the development of the female nucleus, fertilisation and embryo. The paper concludes with a discussion on the systematic position of *Taxodium* and a summary.—*G. H.*

Thian-schan and Turkestan, Travels in. By Ed. Ryssel (*Die Gart.* pp. 459, 476, 489, 498, 513; June and July 1903).—A scientific expedition by a German gentleman, accompanied by the author as

botanical collector and interpreter, starting from Buchara through plains of little interest. Save near rivers where irrigation can be used, the country is in summer a veritable desert and few shrubs are to be seen, *Holostachys caspica* and *Holoxylon Ammodendron* are among the few which grow in the sandy loam soil. Where the soil can be irrigated the land is carefully cultivated, and almost everything in fruit or vegetables is grown, also Cotton, Rice, Maize, and splendid Grapes, and a great deal of fruit, including Grapes, is dried and exported. The inhabitants are hard-working and shrewd people, and fruit, vegetables, and other produce is very cheap. The city of Buchara, surrounded by these highly-cultivated gardens and fields, is a most interesting town, and during the early spring Tulips, *Iris reticulata*, and other bulbous plants are seen everywhere in a wild state. The non-irrigated steppe is after May a perfect burned-up plain, not even weeds remaining alive. Samarkand, another bright spot, is famous for its fine quality of Walnuts, which are exported. Almost every inch of land is cultivated and kept painfully clean and free from weeds. The inhabitants (the Sarden) are a most industrious people, who improve at present large tracts of land by irrigation (cutting canals &c.). Peaches, Apricots, and *Pistacia vera* are extensively grown for export, and are sold when dry to dealers at the extraordinary low price of 1 rubel 50 to 60 kopeker (about 3*s*. to 3*s*. 4*d*. per pud, equal to kilo 16·381). Locusts are very often a terrible plague, destroying crop after crop in the early part of the year. Taschkent and Samarkand are trade centres, and the newer parts of the towns have wide regular streets, lined with canals and rows of trees such as *Ulmus pumila* and *Populus alba*. Travelling, however, is very expensive, posting, *e.g.*, costing from Taschkent to Przewalsk, only a distance of 190 kilomètres, for one person 160 rubel, about £16, and the country, excepting for an attractive spot here and there, is very uninteresting. After May the plains, except where irrigated, are bare of vegetation, and the hills are not much better. Tschimkent is a small town having a factory where quinine is extracted from a plant called "Termene."

The author describes the vegetation on the Tschu river as more interesting; there is more vegetation, although the heights are nearly everywhere robbed of their forests. In one part he found such a number of *Eremurus himalaicus* (probably *E. turkestanicus*) in seed that it would have amounted to tons of seed if it had been collected. *Ephedra intermedia* and *Incarvillea Olgæ* also grow in large masses. In some of the small towns the author noticed among cultivated plants the early Cactus Dahlias, such as Giant Cactus, *picta*, &c., carefully tended in the small gardens of the peasantry. After many adventures the travellers reached the Khan-tengri (or at least the foot of the mountain), which has never been ascended. After trying in vain to ascend this mighty giant and waiting for ten days, the whole expedition had to return *viâ* the Kaiüntü valley to Saritscha. The slopes are covered everywhere with species of *Primula* resembling *P. cashmeriana*, *Saxifraga*, *Papaver*, *Leontopodium*, and lower down with *Berberis*, *Oxytropis*, *Rhododendron*. Bad weather set in at the end of August and reluctantly they returned to Narikol, from whence another attempt on the mountain was made with fresh provisions and new horses. From Narikol they travelled *viâ* the Muzart Pass into China and

paid a visit to the old town of Ak Su. The whole expedition ended, however, in a failure, owing to scant preparations and want of funds.

G. R.

Timber, The Seasoning of. By Hermann von Schrenk (*U.S.A. Dep. Agr. Bur. Forestry, Bull.* 41).—This bulletin deals in a very clear and lucid manner with the preliminary seasoning of timber which precedes the actual chemical treatment. It is well known that there is a vast difference in the length of life of seasoned and of unseasoned timber, and in order to do away with the injurious results of warping and shrinking many devices in air seasoning and particularly of kiln drying have been resorted to.

In this country we are far behind in the matter of timber seasoning; indeed, in the majority of cases our home-grown woods receive little or no attention in this way, trees being felled to-day, and cut into fencing to-morrow, even creosoting being very rarely resorted to.

There are excellent illustrations of how to pile logs so that seasoning may go on slowly, thus avoiding splitting and warping, while a number of seasoning tests with approximate costs are of the greatest value to everyone who is at all interested in the life of our various timbers.

A. D. W.

Tobacco, Cultivation and Curing. By T. J. Harris (*Bull. Dep. Agr. Jam.* vol. ix. pt. 10, p. 148; 2 illustrations).—This contains a description of each process.—*G. H.*

Tomato Industry of the Arkansas Valley. By H. H. Griffin (*U.S.A. Exp. Stn. Colorado, Bull.* 73, Feb. 1903).—The Tomato was first grown by the natives of tropical America before the continent was discovered. It was afterwards known as the 'Love Apple,' and considered poisonous, but was cultivated both in Europe and America as a decorative plant. About the beginning of the last century it began to be used for food, but down to 1832 was still looked upon as a curiosity in New England. At the present time about 300,000 acres are devoted to the crop in the United States and the produce averages about 5,500,000 cases. In the Arkansas valley it should always be remembered that the bearing season of the Tomato is liable to be much longer than the season of appropriate weather. It is therefore most important to waste none of the available time, and to neglect no means, by early forcing and fertilisation, of bringing the plants to the bearing point at the earliest possible moment.

It is recommended to plant Tomatos close enough together to shade the ground during July and August. The reflection of the sun from light-coloured soils has an injurious effect upon the plants. For the rest, good seed must be used, varieties must be carefully selected, and a constant and uniform supply of moisture must be given, but not too abundant until the blooming period is well started.

Varieties of Tomatos are short-lived. Ten years may be considered the profitable life of a variety, and several old standard sorts are now quite extinct.—*M. L. H.*

Tomato Wilt (*Bacillus solanicola*). (*Qu. Agr. Journ.* xiii. p. 32, July 1903.) This disease, referred to in Journ. R.H.S. xxvii. p. 819, under

the probable name of *Bacillus phytophthorus*, was attributed at first by M. G. Delacroix to an organism described as *Bacillus solanacearum*, but subsequently he has been led as the result of his examinations to state that the disease in question is not to be attributed to that organism, but to another, which he has called *Bacillus solanicola*. The attacked plants wilt suddenly, and after a time leaves and stalks become discoloured and die. The pith is found to turn brown, with small warty spots on the stems, and droplets of dirty white liquid exude. This liquid is full of bacteria. This disease is spread by inoculation caused by the bite of insects ; it is also associated with the web-like ground fungus *Rhizoctonia solani*. The first step is to spray with a poisonous mixture, and destroy those insects which feed from plant to plant. One ounce of Paris green in ten gallons of Bordeaux mixture will effect this. Carefully dig round the diseased plants, and prevent the spread of web-like fungus to healthy plants. Root up and carefully burn diseased plants. Tomatos, Potatos, Egg-fruit, Black Nightshade, Cape Gooseberry, &c., harbour the germs of the disease.—*M. C. C.*

Trees, Doctoring unhealthy (*Journ. Hort.* August 20, 1903, p. 170).—An Indian entomologist has invented a method of introducing into the stems of Apple and Pear trees salts of iron, by which chlorose (pale foliage) is cured, and the vigour of the tree much increased. Injecting sulphate of copper has also in many cases a beneficial effect. The editor remarks that this discovery opens a wide field of practical utility.—*C. W. D.*

Trees in Paris (*Gard. Mag.* No. 2597, p. 526 ; 8/8/03).—An interesting discussion on the merits of the various kinds of trees planted in Paris.—*W. G.*

Trees for Shade in New Mexico. By Fabian Garcia (*U.S.A. Exp. Stn. New Mex. Bull.* 47 ; 29 figs).—Advocates the planting of trees along roads, giving practical hints for their culture, and a good list of plants suitable for the purpose and for the ornamentation of ground around houses.—*E. A. B.*

Trees for Shade in Wyoming. By Aven Nelson (*U.S.A. Exp. Stn. Wyoming, Bull.* 57 ; 5 plates).—Shows clearly what might be done to beautify a treeless district, giving directions for planting and preserving suitable trees.—*E. A. B.*

Trees, Transplanting Large. By W. Dallimore (*Gard.* p. 355 ; 21/11/03).—When making new gardens or altering old ones it is often found necessary to remove trees which are too large to lift in the ordinary way and which it is not desirable to destroy. To move large trees successfully move a large mass of soil with them, and to do this planks and rollers or lifting machines must be used. This article gives instructions for carrying out this work and is illustrated, the photograph showing a tree in process of removal.—*E. T. C.*

Trees, tightening their roots when newly planted (*Journ. Hort.* June 4, 1903, p. 489).—Newly-planted trees often fail to thrive

because the soil is loose round their roots. It is a good plan to examine them a month or two after planting and press the soil tighter if required.
C. W. D.

Tropical Fruit Trees and other plants, Propagation of. By G. W. Oliver (*U.S.A. Dep. Agr. Bur. Pl. Ind. Bull.* 46, 8/1903 ; 8 plates).—This bulletin notes the districts of North America where Mango, Loquat (*Eriobotrya japonica*), Fig, Tea, and Manila Hemp (*Musa textilis*) may be profitably cultivated, and insists upon the necessity of vegetative reproduction in order to obtain the best results. In the case of the Mango budding is recommended, the method advocated being that described by Sharrock in 1672, except that buds at least one year old should be used ; they should be taken preferably from wood old enough to have lost its leaves. Stocks raised from seeds are best ; cuttings, although they callus well, do not root readily. Mango scions packed in various ways, were sent to Washington from Colombo, Ceylon ; some bud sticks less than three-quarters of an inch in diameter having their cut ends coated with collodion and covered with clay mud, packed in a small amount of moist coir in a tin tube, arrived in the best condition. The Loquat should be propagated by buds from young, well-ripened wood, inserted on stocks raised from seed.

Figs are best raised from cuttings, but now that the insect which pollinates the flower of the Smyrna Fig has been naturalised in California grafting of Smyrna Figs on hitherto unprofitable stocks is advocated. The method suggested is to prepare the stock as for shield budding, but, instead of inserting a single bud, to use a small twig having a terminal and one or two lateral buds. Tea is best propagated by cuttings of newly-ripened shoots, but layering, veneer grafting, and herbaceous grafting may all be successfully carried out. Plants raised from seed show great variation. Manila Hemp is increased by the division of the rhizome, and the method of raising from seed is described.

The plates illustrate the most important methods of budding, grafting, &c.—*F. J. C.*

Truffles, Their Cultivation as practised in France. By P. Hariot (*Le Jard.* July 5, 1903, p. 193).—*C. W. D.*

Truffles, The Reproduction of. By D. C. (*Bull. R. Soc. Tosc. Ort.* 10, p. 306 ; October 1903).—At its session of the 4th of May, 1900, MM. Matruchot and Émile Boulanger both announced, to the Parisian Academy of Sciences, as a result of their independent experiments, the germination of the ascospores of the Truffle in a watery, sterilised liquid. The following is taken from Matruchot's account:—Spores of *Tuber melanosporum* were sown on pieces of potato, sterilised and soaked in a nutritive liquid. After a few weeks there was a great development of mycelium, an unlimited quantity of which he was able to produce. He succeeded in collecting mycelium in Périgord and preserving pure cultures of the same, which were identical with those obtained from the germination of the spores. The same researches and cultures were repeated with the Burgundy Truffle (*T. uncinatum*), from which mycelia were obtained differing only in secondary characters from those of the preceding species.

When cultivated in the laboratory, the mycelium of both species never produces conidia, but forms at length sclerotia, which increase in size until they become 8–10 mill. in diameter. These sclerotia, which are at first white, then reddish, variegated with green, and finally black, must be regarded as young Truffles, which, through being confined within the culture-tubes, are prevented from attaining their normal condition. Some observers (Grimblot, Ferry de la Bellone) believed the colour of the Truffle mycelium to be brown, others regarded it as white; Matruchot proves that the former opinion is the correct one. The colour in the native soil of the mycelium is brownish-red. Truffles are found under Oak-trees, but before appearing, an incubation period for the spores of 8, 10, 15, or even 20 years always obtains. Some trees always remain sterile. Further, the distribution of the Truffles is always irregular and capricious.
W. C. W.

Tulips. By G. B. Mallett (*Gard.* p. 406; 13/6/03).—A valuable series of articles describing all the best species and varieties of Tulips, their characteristics and culture. The cultivation of Tulips presents no difficulty that cannot be overcome in any part of the British Isles, and there is no reason why every Tulip-bulb required by British gardeners should not be grown at home. The ideal soil is a light and sandy one, but in most cases the Tulip will accommodate itself to any soil or situation, provided it is lifted to ripen.—*E. T. C.*

Tulipa præstans. By W. B. Hemsley (*Bot. Mag.* tab. 7920).—Nat. ord. *Liliaceæ*, tribe *Tulipeæ*. Native of Bokhara. Perianth-leaves scarlet-vermilion, with a yellow base. Stamens have scarlet filaments with crimson anthers.—*G. H.*

Turnip-gall Weevil, The (*Gard. Mag.* No. 2591, p. 421; 27/6/03).—A description of this pest (*Ceutorrhynchus sulcicollis*), which in some seasons is so destructive in Turnip crops. The life habits of the insect are given, with instructions on the best way to extirpate it.—*W. G.*

Turpentine Orcharding, A New Method of. By Dr. Charles H. Herty (*U.S.A. Dep. Agr. Bur. Forestry, Bull.* 40).—Within recent years the greatly increased demand for spirits of turpentine and resin has led to an enormous growth in the industry, the chief centres being Northern and Southern Carolina. To those who are at all interested in the resources of our woods and forests, the ever-increasing industry of turpentine orcharding, as related by Dr. Herty, will be of special interest; while the great saving now effected by systematic tapping of the trees will show what vast strides have been made in that direction of late years. The various operations from what is termed "box-cutting"—the original cut from which the resin exudes and is collected—to distillation are lucidly explained; while the score of illustrations give one an excellent insight as to carrying out the various methods now generally adopted in this quickly expanding industry.—*A. D. W.*

Uredineæ, Japanese. By P. Dietel (*Engl. Bot. Jahrb.* xxxii. 1903. pp. 624–632; 7/7/1903).—A further contribution by this author to the

Fungus-flora of Japan. Several new species are described, and the conclusion is drawn, from the large number of new species found in a small area in a comparatively short time, that the Uredine flora of Japan is a rich one.—*A. B. R.*

Vanda hybrida, 'Marguerite Maron' (*V. teres* × *V. suavis*). By G. T. Grignan (*Rev. Hort.* Dec. 16, 1903, pp. 574–5; coloured plate).—The plate depicts the hybrid and the two parents, the characters of which are beautifully combined, forming a very handsome and interesting combination, distinctly superior to either parental form.—*C. T. D.*

Variation, Effect of Manures on. G. T. Grignan (*Rev. Hort.* Dec. 1, 1903, pp. 556–7). Abstract of results of trials by M. Emile Laurent with Carrots from 1897 to 1902.—Choosing a very stable variety, "semi-long dwarf," he cultivated it in soils enriched respectively with (1) nitrogenous manure, (2) potash, (3) phosphoric acid, (4) lime, and (5) common salt. As a result in the last generation raised it was found that in No. 1 they had assumed a slightly conical form ending obtusely; in 2, 3, and 4, they were cylindrical with obtuse ends; while in No. 5 they were all conical and finely pointed, showing that salt induces a lengthening, accompanied by slender terminals. These characters appeared more or less gradually in the successive cultures, and therefore must have been to some extent inherited, but no trials are recorded as to tendency to reversion when sown in differently constituted soil. Other trials are noted to determine the effect of mineral admixtures on sexual development, nitrogenous manures or lime in excess producing a majority of males in Spinach, while potash and phosphoric acid augmented the number of females; the seeds, on the other hand, are conversely affected.
C. T. D.

Variation in Trillium grandiflorum. By H. W. Britcher (*U.S.A. Exp. Stn. Maine, Rep.* 1902, pp. 169–196; 6 plates).—This contribution towards the statistical study of variation gives measurements and notes regarding 185 plants of *T. grandiflorum* collected at Syracuse, New York.—*F. J. C.*

Variation, Wild and Cultural. By C. T. Druery (*Gard. Chron.* No. 886, p. 418; Dec. 19, 1903).—The object of this article is to show that, contrary to the general opinion of botanists, "sports" are more likely to occur among wild than cultivated plants. The writer points out very truly that "plants under cultivation are always in a particularly favourable position for the immediate observation of such departures by experienced observers." He then at some length quotes the case of Ferns, showing by a table that, while the number of varieties obtained under cultivation is some 730, the number that have been found in a wild state is 1,360.
G. S. S.

Vellozia equisetoides. By W. W. (*Gard. Chron.*, No. 886, p. 425, fig. 167; Dec. 19, 1903).—The genera *Vellozia* and *Barbacenia* belong to the order *Amaryllidaceæ*, but, unlike the ordinary bulbous representatives of that order, most of the species have branched woody stems

bearing tufts of leaves as in a *Cordyline* or *Yucca*, some being ten feet high and as thick as a man's body. Some of the species have large handsome flowers. Imported plants have never done well in this country, but recently some plants of *Vellozia equisetoides* have been received at Kew from the British Central Africa Protectorate, which are flowering well, as may be seen from the figure. The plant is two feet in height, and bears "crowds of lilac-purple flowers two inches across, and deliciously fragrant." This species attains the height of five feet.—*G. S. S.*

Veronica Hulkeana. By S. W. Fitzherbert (*Gard.* p. 115; 15/8/03).—This shrubby New Zealand *Veronica* is without doubt the most beautiful of its section. In the late spring a plant such as is illustrated, which fills a wall space 4 feet by 4 feet, is a lovely picture, being covered with long branching flower panicles of a delicate lavender colour. The one drawback to it is that large plants often die in an unaccountable manner, generally after flowering.—*E. T. C.*

Veronica virginica. By S. Arnott (*Journ. Hort.* December 17, 1903, p. 535).—A very striking and distinct hardy herbaceous plant from North America, growing four feet or more high. The type is dull white. There is a variety with purple flowers called var. *sibirica*; by crossing these, distinct shades of colour as well as different habit may be obtained. It is a good flower for cutting for tall vases.—*C. W. D.*

Vines, A new Disease of (*Le Jard.* August 20, 1903, p. 242).—An alarm is raised of a disease which has appeared in Sicily, in which the plant withers branch by branch. It is said also to attack Figs.

C. W. D.

Vines, Famous (*Gard.* p. 320; 7/11/03).—An illustrated account of the most famous Vines in Great Britain, with particulars as to their size, age, and yield.—*E. T. C.*

Vines in late Frosts. By L'Abbé A. Jannin (*Ann. Soc. Nant. des Amis Hort.*, 1903, p. 76).—The Abbé repeats the observation that, in the wholesale destruction of Vines during the April frosts of 1903, those branches which were not fastened at all, while not entirely escaping damage, certainly suffered less than those which had been tied in to wire supports.—*M. L. H.*

Vines, Seedling Varieties of Cape Origin. By D. G. Fairchild (*U.S.A. Dep. Agr. Bur. Pl. Ind., Bull.* 25, p. 13).—Three varieties described: (1) 'Red Hanepoot' Grape; (2) *Vitis rupestris metallica*; (3) *V. rup.* 'Le Roux.' The first of excellent eating quality, the others useful as good grafting stocks.—*E. A. B.*

Weeds, and how to kill them. By L. H. Dewey (*U.S.A. Dep. Agr., Farm. Bull.* 28, 1902; 11 figs.).—Gives general methods to be adopted for the eradication of annual, biennial, and perennial weeds, and describes ten weeds, including the European introductions *Lactuca Scariola, Chondrilla juncea, Daucus Carota, Avena fatua*, and *Camelina sativa*, giving the best methods to be adopted for their destruction in the

several cases. A table of 100 weeds is given at the end, with a considerable amount of useful information about each.—*F. J. C.*

Weeds, Noxious, and How to Kill them. By L. R. Waldron (*U.S.A. Exp. Stn. North Dakota, Bull.* 56, June 1903; plates).—The bulletin begins with two maxims in different type:

"The price of clean land is eternal vigilance.

"Methods of weed eradication in North Dakota lie along the lines of improved crop rotation, intensive farming, and pure seed-grain."

The weed question in North Dakota is apparently a serious one, and the bulletin aims at arousing all farmers in the region to a sense of its importance and at providing them with the latest information on the subject.

The first point is to recognise the most pernicious weeds at once and to possess a knowledge of their habits. To this end careful descriptions are given of all the worst offenders, with accurate drawings of some, and hints are given for the eradication of the different sorts; the treatment which will kill one being that best adapted to the spread or reproduction of another.

Foul seed-corn is much to blame in spreading weeds. Hundreds of samples of grain meant for sowing have been examined by the Department of late years, and in the vast majority of cases have been found to be full of weed seed. In order that the farmer may recognise this for himself, and may not ignorantly scatter pests in his own fields, the Botanical Department has prepared collections of small stoppered bottles, each containing seed of one of the twenty-five worst weeds of North Dakota, and carefully labelled, and these are supplied to farmers in the region at a small cost for comparison with their own samples of grain.

M. L. H.

Weigelas (*Gard. Mag.* No. 2602, p. 613; 12/9/03).—A descriptive account of the numerous species and varieties of *Weigela* in cultivation. The best for general cultivation are noted.—*W. G.*

Wheats, Hardiness of. By J. Eriksson (*Nat. Zeit. Land-Forst.* i. pp. 146–156; 1903).—Details of 146 varieties and hybrids of winter-wheats are tabulated so as to show the degree of hardiness during twelve winters (1889–90 to 1900–1) in Sweden. Some English wheats are included, but the majority are absent. Australian hybrid wheats have received attention and proved very hardy, especially crosses with 'Improved Fife.'—*W. G. S.*

Wheat-smut (*Tilletia fœtens*), **Treatment.** By Joseph Reed (*U.S.A. Exp. Stn. Colorado, Bull.* 79, March 1903).—The experiments were made on seed so badly diseased that no one would think of using it for seed. The sprinkling method proves to be as effective as the soaking method. Sprinkling with copper sulphate is recommended as the best remedy. Solution, one pound of copper sulphate to four gallons of water. It is the cheapest, the handiest to use, and gives as good results as any treatment tried. To treat the grain by the sprinkling method, place the grain in a bin large enough, so that the grain can be shovelled from one

side to the other. Sprinkle the solution on with a common watering-pot, and at the same time keep shovelling the grain over and over. When the kernels are all wet the treatment is finished. The grain should not be treated very long before planting, or it will start growing. After treatment it should be allowed free circulation of air, so that it will dry quickly.—*M. C. C.*

Wild Rice: its Uses and Propagation. By Edgar Brown and Carl S. Scofield (*U.S.A. Dept. Agr. Bur. Pl. Ind., Bull.* 50, 1903; illustrated with seven half-tone plates).

Wild Rice (*Zizania aquatica*) is a valuable product, as it is almost the chief farinaceous food of the North American aborigines, especially the Ojibwas, and also serves to fatten myriads of wild fowl in the eastern half of the States. Attempts to sow it artificially have generally failed owing to its not germinating. This pamphlet gives the result of experiments on this subject, and it has been found that the best way to ensure success is as follows:

Firstly, to place the order for seed early, before the Wild Rice harvest has taken place, so that it may be shipped immediately.

Secondly, to keep the seed moist, whilst travelling or stored, either in barrels of water constantly changed, or in wet packages of moss or excelsior, properly ventilated.

Thirdly, to sow as soon as possible, preferably in autumn, in a suitable depth of water, not stagnant, nor yet so swiftly running as to wash away the soft mud beneath.—*C. H. C.*

Willows. By R. P. Brotherston (*Gard. Chron.* No. 855, p. 305; May 16, 1903).—These trees are known by a great variety of names in this country. These and the many uses to which the wood, &c., is put are given very fully in this article, and many old customs and traditions in connection with these plants are mentioned. The cultivation of the Osier in this country appears to have been first tried just a hundred years ago; previously they had been imported from Holland.—*G. S. S.*

Wire Netting for Strawberries and Peas (*Journ. Hort.* October 29, 1903, p. 400).—Coarse wire netting, 3-inch mesh, arched over Strawberries so that the flowering stalks grow through it, supports the fruit and saves it from the soil. A method for utilising similar netting where pea rods are scarce is explained. The writer has adopted the plan successfully for half a century.—*C. W. D.*

Woodlot, The. By Henry Solon Graves and Richard Thornton Fisher (*U.S.A. Dep. Agr. Bur. Forestry, Bull.* 42).—This handbook is mainly intended for the use of owners of woodlands in Southern New England, and contains chapters on planting, pruning, woodland protection, injuries to timber, and reproduction. Practically the whole of the New England forests are under sixty years' growth, which means that the entire area has been cut over at least once, the owners generally felling their timber as soon as it is fit for the market. Generally speaking, these forests are composed of hard woods, such as Oak, Chestnut, Maple, Hickory, and Ash, though in Rhode Island the White Pine abounds along

the ridges, and by the borders of streams and lakes. Nearly every farmer owns a woodlot, which he turns to practical use in the construction of fences and for firewood, any remaining lots being disposed of in the market, for which, evidently, both demand and prices are good. The chapter on pruning and how far it should be carried out is decidedly practical; while the notes on insect pests and damage by fire and wind to the forests show lucidly what has to be contended with in the rearing and converting of timber in Southern New England. The excellent illustrations go far in elucidating the text.—*A. D. W.*

Woolly Aphis of the Apple (*Schizoneura lanigera* Hausmann). By C. L. Marlatt (*U.S.A. Dept. Agr. Div. Ent., Circ.* 20 (2nd series), illustrated).—The woolly aphis manifests itself in two forms, above ground and on the roots, the latter frequently damaging young trees and nursery stock. Like the phylloxera on Vines, it produces swellings and galls on the roots and poisons the tissues, besides exhausting the vital juices of the plant. When the tree has become established it is less dangerous. The aerial form is useful as indicating the probable presence of the aphis on the roots, which, when it does not kill the tree outright, weakens it and exposes it to the attacks of insect enemies. Some varieties of Apple, and also the Crab, do not suffer from this pest, and probably the use of such stocks would procure immunity. Its origin is probably American; it was first noticed in England in 1787 on stock imported from America, where it spread rapidly. It is more noticeable in the northern than in the southern latitudes of Europe.

Its life-history is complicated, and probably resembles that of the phylloxera. The aerial form is killed out in winter by severe cold, but the root form persists through the winter and gives rise to new generations in the spring. Remedies are easily applied to the former, and consist of the usual washes, but the root form is more difficult to reach. Water at nearly the boiling point has been used successfully and does not injure the roots of even young trees. Finely-ground tobacco dust is remedial and protective. It only costs about one cent per pound, and is besides worth its cost as a fertiliser. Bisulphide of carbon destroys the louse, but does not protect against future attacks. It may be dangerous to the tree if not carefully used, is highly inflammable, and more expensive than the tobacco dust.

Nursery stock can be sent out clean by pruning the roots when taken up, and immersing for a few seconds in water at 120° F. Strong soap solution and kerosene emulsion are still more certain remedies.

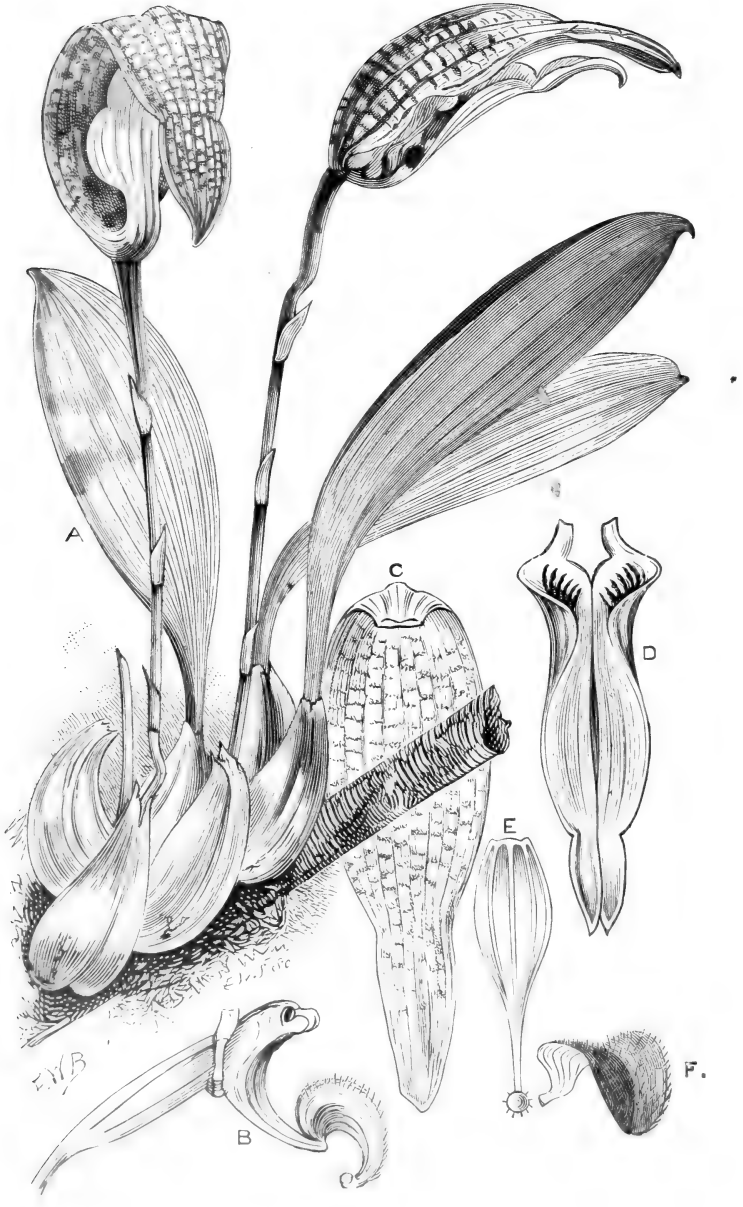
Good cultivation in newly-planted orchards is absolutely essential for the first two or three years, that being the danger period; established and strongly-growing trees are less susceptible to the attacks of the root louse, while ill-cultivated, neglected orchards are sure to succumb.

The natural enemies of the woolly aphis are generally sufficient to protect mature trees from attack, the nine-spotted lady-bird's larvæ being particularly useful.—*C. H. C.*

Yucca karlsruhensis (*Y. filamentosa* × *Y. glauca*). By L. Graebener (*Die Gart.* p. 7, October 3, 1903).—In Germany, where the

winter temperature is often very low, hardly any species of the Yuccas, which are quite hardy in England, can be considered really hardy. This new hybrid (although *Y. glauca*, one of the parents, is not hardy) is perfectly hardy and it is intermediate between the two parents.—*G. R.*

Zinnia elegans pumila fl. pl. aureo variegata. By L. Wittmack (*Gartenflora*, 1/8/03, p. 395; pl. 1517).—A brief description and coloured plate of some small varieties of *Zinnia elegans*.—*J. P.*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EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

January 13, 1903.

Mr. Alexander Dean in the Chair.

Fellows elected (85).—Frank Ambler, Lieut.-Col. H. W. Apperley, David Arthur, M.D., George Baikie (Transvaal), John Bailey, H. Barker, W. Bassett, Richard F. Bolitho, Hon. Mrs. Bourke, Stewart E. Brock, Lady Brooke, Herbert Brooker, James Brown, J. Russell Buckler, H. A. Butler, William Campbell (Transvaal), Stephen Castle, Mrs. A. F. Clarke, J. C. Crassling, Miss May Crooke, Miss M. J. Davis, Samuel Doncaster, Countess of Dudley, Mrs. A. L. Dymock, G. J. Dymott, Lady Clayton East, Mrs. Egerton, John A. Ellis, Miss Ferguson, Mrs. H. Finlay, R. G. Fortt, Mrs. C. J. Furnivall, James Gibson, Dr. Glover, Mrs. Frank Goad, Zechariah Gray, Mrs. W. Grimston, John Heelas, Jun., Miss Heldmann, S. F. Higgins, F. H. Hindle, Miss Hodge, L. J. Humphrey, Milton H. Hutchings, Mrs. Leopold Jenner, R. B. Jowitt, J.P., H. Koenigs, S. Ladell, Mrs. Lakin, C. Martin, Miss C. E. Martin (U.S.A.), Mrs. Menpes, C. G. Newkirchner, R. Newbold (U.S.A.), L. H. Oakshott, Miss G. Owen, Mrs. Parlby, W. M. Paterson, W. Paulson, H. Peacock, M. Peake, Miss Piesse, E. H. Potter, H. Richardson, T. W. Scargill, Mrs. Scott, Miss Eva M. Shackleton, Mrs. Sherwin, Mrs. John Smail, H. D. Streatfield, G. H. Taylor, W. Titterington, A. E. Wadmore, Miss F. Wallroth, Alfred C. Waters, Mrs. T. B. Watson, R. M. Wharam, A. S. White, James Whitton, J. W. Willcocks, D. Womersley, Mrs. Wythes, J. H. J. Young, John Young, F. W. Zurhorst.

Associates (3).—J. P. Dickson, A. C. Forbes, R. H. Weddell.

Affiliated Societies (2).—Capel, Ockley, Newdigate, South Holmwood, and Rusper Horticultural Society; Emerson Park Horticultural Society.

GENERAL MEETING.

January 27, 1903.

Mr. Harry J. Veitch, F.L.S., in the Chair.

Fellows elected (46).—James Bache, F. G. Baker, R. Barbier (France), H. Barry, F. Bate, A. H. Blake, A. J. Bliss, H. J. Bliss, W. Bowell, E. P. Braid, Mrs. E. Close Brooks, T. R. Bulley, H. E. Buxton, Mrs. S. Buxton,

Mrs. W. F. Campbell, James Caverhill, Arnold J. Cleaver, Miss E. Clinton, Alfred E. Copland, William R. Emmott, Countess Fitzwilliam, W. Foden, Francis E. Gale, Peter Garrick, Mrs. E. G. von Glehn, H. G. Goodson, Allan T. Hall, Mrs. E. Hall, William Hewitt, Mrs. Micklem, William Mitchell, Robert A. Morris, Mrs. R. Morton, E. G. Parker, H. A. Perkins, F. W. A. Radford, Isaac W. Read, Mrs. D. Schloss, J. Goff Spencer, Baron de Teissier, Robert Todd, Mrs. Robert Todd, E. A. Voisin, Mrs. B. Walker, Miss E. Wilkinson, Mrs. H. Woolner.

Associate (1).—George Harper.

Society Affiliated (1).—Tonbridge Gardeners' Society.

A lecture on the "Cultivation of the Blue *Nymphæa*" was given by Mr. James Hudson, V.M.H. (See p. 86.)

GENERAL MEETING.

February 10, 1903.

Sir Trevor Lawrence, Bart, K.C.V.O., V.M.H. (President of the Society), in the Chair.

The Minutes of the last annual meeting were read and signed.

Fellows elected (80).—Charles Ayres (Cape Town), Alex. Baines, A. H. Balfour, W. W. Blest, C. Boosey, H. F. Bowles, S. Briggs-Bury, T. B. Brockbank, Mrs. H. Brooks, Rev. W. F. Brown, Lady Brownlow, C. Buckland, F. H. Burrough, A. R. E. Burton, Mrs. Calverley, Mrs. A. des M. Campbell, Major R. J. Carthew, J.P., D. M. A. Chalmers, John Collingridge, Lady Evelyne Cotterell, W. F. Courthope, Rev. R. Lewes Dashwood, A. J. Dover, Joseph Drakes, R. Forbes, Dr. Lena Fox, C.M.S., G. Frankum, Joseph Giles, Miss Gowan, Sir Gilbert Greenall, Bart., James Griffiths, J. S. Gunn, A. W. Hart, H. G. Hawker, Alex. Hislop (South Africa), Miss M. H. Hunt, Miss B. A. Ince, R. Jackson, Lady E. James, Mrs. H. Johnstone, W. Kipping, Mrs. T. F. Kynnersley, F. Ladds, Marcus Larson, Duke of Leeds, Col. W. Lowndes-Salmon, Mrs. A. Lupton, W. E. Lynall, J. H. McGowan, Mrs. J. Marshall, Miss M. D. Martin, Harry Martin, J. J. Mathieson, Viscountess Morpeth, A. V. Parker, Mrs. Peake, Sir Harold Pelly, Bart., L. C. W. Phillips, Mrs. Pollock, H. H. Temple Powell, Robert Ready, G. Handel Roberts, A. Robinson, G. C. Scaramanga, M. R. W. Sibthorpe, Mrs. Smart, J. W. Stephens, H. Stevens, Rev. James Sunderland, M. Walker Tidd, Miss M. Trevor, Miss E. Tuck, R. Upton, Mrs. R. Urquhart, Sir William Vincent, Bart., J. Walters, Miss A. H. Warrender, Mrs. H. Whitfield, Mrs. G. F. Wilson, Mrs. Wynne.

Societies Affiliated (2).—Formby Horticultural Society; Walton-on-Thames and District Rose Society.

A vote of thanks to the retiring Members of Council was moved by Mr. Alexander Dean, seconded by Mr. George Paul, J.P., V.M.H., and carried unanimously.

The President moved the adoption of the Report.

This was seconded by Mr. A. W. Sutton, V.M.H.

The Secretary read the names of the proposed new Members of Council,

Vice-Presidents, and Officers, and the President subsequently declared them all duly elected, viz.—

As new Members of Council.—The Right Hon. Lord Redesdale, the Hon. John Boscawen, William Marshall, Esq.

As Vice-Presidents.—The Right Hon. Joseph Chamberlain, M.P., the Right Hon. the Earl of Ducie, the Right Hon. Lord Rothschild, Sir John Dillwyn Llewelyn, Bart., Sir Frederick Wigan, Bart.

As Officers.—Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., President; J. Gurney Fowler, Esq., Treasurer; Rev. W. Wilks, M.A., Secretary; A. C. Harper, Esq., Auditor.

An Amendment as follows was moved by Mr. H. J. Elwes, V.M.H., and seconded by Surgeon-Major Ince: "That a Committee be appointed by the subscribers to confer with the Council as to the Hall, and as to the proposed surrender of Chiswick, and that no contract be entered into until that report has been presented to a General Meeting of the Society."

On the Amendment being put to the vote only nine hands were held up in its favour, the great mass of the meeting voting against it. The President then put the original motion for the adoption of the Report, which was carried with enthusiasm, *nemine contradicente.*

The Rev. G. H. Engleheart, M.A., V.M.H., proposed, and Mr. C. T Druery, V.M.H., seconded: "That a hearty vote of thanks be given to the President for his skilful and kindly conduct of the meeting." There were about 200 Fellows present.

REPORT OF THE COUNCIL

FOR THE YEAR 1902.

1. It is gratifying to the Council to record that in this, the 99th year of the Society's existence, a larger number of new Fellows joined the Society than in any year since its first establishment in 1804. The exact number of new Fellows elected in the past year has been 1,140, which, if contrasted with the 1,108 who formed the whole number of the Fellows when the Society left South Kensington in January 1888 indicates the development which is continuously taking place in the Society. The Council hope that everyone who has the Society's welfare at heart will continue to endeavour to promote it by enrolling new Fellows.

2. Under the head of ordinary expenditure at Chiswick £1,953 has been spent on the general work and maintenance of the gardens, including legal expenses. The receipts by sale of surplus produce amount to £373, making the net ordinary cost of the garden £1,580.

3. Twenty-two Fruit and Floral Meetings have been held in the Drill Hall, Buckingham Gate, Victoria Street, besides the larger Shows in the Temple Gardens on May 28, 29, and 30; at Holland House on June 24 and 25; at the Crystal Palace on September 18, 19, and 20. Lectures or Demonstrations have been delivered at almost all of the Meetings.

4. The number of awards granted by the Council, on the recommendation of the various Committees, will be seen from the following table:—

Award	Truro Show	Purchased by Affiliated Societies	Temple Show	Holland House Show	Crystal Palace Fruit Show	On Recommendation of				Total
						Fruit Committee	Floral Committee	Orchid Committee	Narcissus Committee	
Gold Medal	—	—	7	12	2	6	6	3	—	36
Silver Cup	—	—	21	24	2	—	—	—	1	48
Hogg Memorial Medal...	—	—	—	—	3	4	—	—	—	7
Silver-gilt Flora ...	3	—	15	15	—	—	21	6	3	63
Silver-gilt Knightian ...	—	—	2	1	4	[7	—	—	—	14
Silver-gilt Banksian ...	1	—	7	6	1	—	24	—	—	39
Silver Flora	3	7	13	11	—	—	58	46	8	146
Silver Knightian ...	1	—	3	—	3	13	—	—	—	20
Silver Banksian ...	—	19	15	10	—	15	66	35	6	166
Bronze Flora	—	10	—	—	—	—	12	—	—	22
Bronze Knightian ...	—	—	—	—	—	—	—	—	—	—
Bronze Banksian ...	1	11	—	—	—	1	24	—	2	39
Silver Gilt ... Affiliated	—	3	—	—	—	—	—	—	—	3
Silver ... Society's	—	28	—	—	—	—	—	—	—	28
Bronze ... Medal	—	19	—	—	—	—	—	—	—	19
First-class Certificate ...	1	—	11	7	—	3	9	31	3	65
Award of Merit... ...	3	—	26	17	—	14	106	72	20	258
Botanical Certificate ...	—	—	10	—	—	—	2	11	1	24
Cultural Commendation	—	—	1	1	—	4	2	19	1	28
Total ...	13	97	131	104	15	67	330	223	45	1025

In addition to the above: A Silver-gilt Flora Medal was awarded to Miss W. M. Buttenshaw for having passed first in the Society's Examination. One hundred and eighteen Bronze Banksian Medals have also been granted to Cottagers' Societies.

5. The Society's Great Show held in May in the Inner Temple Gardens (by the continued kindness of the Treasurer and Benchers) was as successful as ever, and was visited by their Majesties the King and Queen. It is a matter of satisfaction to the Council to find that this Meeting is universally acknowledged to be the leading Horticultural Exhibition of this country.

6. The best thanks of the Society are due to the Earl of Ilchester for his kindness in allowing a great Show of, and Conference on, Roses to be held in his park at Holland House, Kensington, on the 24th and 25th of June. Financially the Show was not a conspicuous success owing to the fact of the King's serious illness taking place on the 24th, but from every other point of view it more than fulfilled expectations. The Fellows will be pleased to know that his Lordship has consented to another Show being held at Holland House in the ensuing year on June 25 and 26. Fellows are requested to inform their friends of this Show, so as to make it this year a financial as well as a floral success.

7. At the request of the various Societies concerned the Council have arranged as follows:—

March 21. Special Prizes for forced Hyacinths and Tulips, offered by the Haarlem Royal Society of Bulb-culture.
April 21. National Primula and Auricula Society's Show.
May 19. National Tulip Society's Show.

July 21. National Carnation Society's Show.
Sept. 1 and 2. National Dahlia Society's Show.
Sept. 15. National Dahlia Society's Committee Meeting.

All these will be held in the Drill Hall in conjunction with the Society's usual Fortnightly Meeting, and full particulars of the Prizes &c. will be found in the Book of Arrangements for 1903.

8. The Exhibition of British-grown Fruit held by the Society at the Crystal Palace on September 18, 19, and 20 was, from an educational point of view, most satisfactory. Full particulars will be found in Vol. XXVII., Part 3, of the Society's JOURNAL, which will be issued in the course of a few weeks.

9. A great desire having been expressed that Vegetables should also be represented at this Show, the Council have willingly acceded to this request, stipulating, however, that they cannot consent to accept any money or prizes which are accompanied with the restriction that the seeds from which the Vegetables have been grown have been procured from any specified firm. The Council are of opinion that all growers should be at perfect liberty to procure their seeds wheresoever they will. The authorities of the Crystal Palace having always strictly prohibited the introduction of Vegetables at this Show, it has been decided to hold it at Chiswick on September 29, 30, and October 1, 1903. Chiswick is nearer to London, and both more easily and more quickly accessible therefrom.

It is calculated that such a combined Show of Fruit and Vegetables cannot be held under an expenditure of £350 to £400. If, therefore, the Show is to take place it will be necessary for all who are interested in the encouragement of the growth of good Fruit and Vegetables within the United Kingdom, now largely dependent on external and foreign supplies, to combine in raising at least half the amount of money required. The Schedule of the Show is being proceeded with and will be ready for issue on April 2, should the list of subscriptions prove satisfactory. The List of Subscribers to the 1902 Show will be given in Vol. XXVII., Part 3, of the Society's JOURNAL.

10. An examination in the principles and practice of Horticulture was held on April 23, concurrently in different parts of the United Kingdom, a centre being established wherever a magistrate, clergyman, schoolmaster, or other responsible person, accustomed to examinations, would consent to act on the Society's behalf, in accordance with the rules laid down. No limit as to the age, position, or previous training of the candidates was imposed. Two hundred and twenty-nine candidates presented themselves for examination. The names and addresses of those who succeeded in satisfying the examiners, together with the number of marks assigned to each, will be found in the Society's JOURNAL, Vol. XXVII., page 196.

11. It is proposed to hold a similar examination in 1903, on Wednesday, April 22. Candidates wishing to enter for the Examination should make application during February to the Secretary, R.H.S. Office, 117 Victoria Street, Westminster.

12. Valuable books have been presented to the Society during the past year by the Director of the Royal Gardens at Kew, Dr. Maxwell Masters,

F.R.S., Rev. A. Foster-Melliar, Mr. E. Bland, Mr. W. E. Gumbleton, Miss Jekyll, V.M.H., Miss Willmott, and others, to all of whom the best thanks of the Society are due. A full list will be published in March, 1903, in the Society's JOURNAL, Vol. XXVII., Part 3.

13. The thanks of the Society are due to all the Members of the Standing Committees—viz. the Scientific, the Fruit and Vegetable, the Floral, the Orchid, and the Narcissus Committees—for the kind, patient, and often laborious attention which they have severally given to their departments. Many of the members of these Committees have to travel long distances to attend. The thanks of the Society are especially due to all who are so good as to serve under these conditions.

14. The Society has also to thank all those who have kindly presented plants or seeds to the Gardens. A list of the donors has been prepared, and will be included in the next issue of the Society's JOURNAL.

15. The Lectures given at the Society's Meetings during the past year have been or will shortly be published in the JOURNAL, and are as follows:—

Jan.	28.	"The Renovation of Old Fruit Trees," by Mr. George Bunyard, V.M.H.
Feb.	25.	"The Use and Value of Nicotine in Horticulture," by Mr. G. E. Williams.
March	11.	"The New Soil Science," by Mr. R. Hedger Wallace.
,,	25.	"Plant Communities," by Professor Carr.
April	8.	"Plants for Pergolas and Verandahs," by Miss Jekyll, V.M.H.
,,	22.	"The Genus *Campanula*," by Mr. Maurice Prichard.
May	6.	"The Classification of Plants by Evolution," by the Rev. Professor Henslow, M.A., V.M.H.
,,	20.	"The Origin and Properties of the English Tulip," by Mr. A. D. Hall.
June	10.	"Weeds of the Garden," by the Hon. Mrs. Boyle.
July	8.	"Ornamental Trees and Shrubs," by the Right Hon. the Earl of Annesley.
,,	22.	"The Botanic Gardens and Flora of Malta," by the Rev. Professor Henslow, M.A., V.M.H.
Aug.	5.	"Small Fruits, from a Private Garden Point of View," by Mr. James Smith, V.M.H.
,,	19.	"Horticultural Education and Teaching in England," by Mr. W. H. Patterson.
Sept.	2.	"Hardy Fruits in Yorkshire," by Mr. A. Gaut.
,,	23.	"Some lesser-known Japanese Trees and Shrubs," by Mr. James H. Veitch.
Oct.	7.	"Experiments with Chemical and other Manures," by Mr. F. W. L. Shrivell.
,,	21.	"Hardy Summer and Autumn Flowering Bulbs," by Mr. P. Rudolph Barr.
Nov.	4.	"The Dietetic Values of our Common Vegetables," by the Rev. Professor Henslow, M.A., V.M.H.
,,	18.	"Spraying Fruit Trees and Packing Apples as Practised in Canada," by Mr. Cecil H. Hooper.

The best thanks of the Society are due to the Lecturers, as also to all who so kindly contributed to the Conference held upon Roses at Holland House on June 24.

16. Several Fellows having represented the difficulty they find in identifying the attendants in charge of the different exhibits at the Society's Meetings, the Council have caused a badge to be prepared which may be worn by attendants, but will carry no special right of admission or other privilege. These badges can be obtained at a small cost by applying at the Society's Offices, and will bear the Exhibitor's name. No other badges will be allowed to be worn by attendants.

17. The reception which has been accorded to the Society's JOURNAL during the past year, not only by the great mass of the Fellows, but also by various scientific bodies and individuals, both at home and abroad, competent to speak with authority on such subjects, has been exceedingly gratifying to the Council. The Fellows may be proud of their JOURNAL, and feel that they are issuing a periodical which will compare not unfavourably with that of any other Scientific Society. At the same time it must not be for one moment forgotten how very deeply we are indebted to the small body of scientific experts who so kindly volunteer their services in making the "Notes on Research" and "Abstracts," which form one of the JOURNAL's most remarkable and useful features. These gentlemen indeed deserve well of the whole Horticultural community, and the Council are glad to take this opportunity of recording the grateful sense of appreciation which they feel for their invaluable services.

18. The Council have the sad duty of recording the death of eighty-nine Fellows during the year, and among them they regret to find the names of the Earl of Fitzwilliam, K.G., Lord Malcolm of Poltalloch, C.B., Sir Henry Tate, Bart., Sir Arthur Wilson, Col. Sir Edward Hill, K.C.B., Col. Sir Henry Collett, the Dowager Lady Heathcote, Hon. H. A. Lawrence, Edwin J. Beale, V.M.H., William Bull, V.M.H., Charles Maries, V.M.H., H. Selfe Leonard, R. Gofton Salmond, Charles J. Grahame, Robert Tunstill, Henry Appleby, Thomas J. Eyre, James Wigan, Benjamin Blenkinsop, Wilfred Hans Loder, John Peed, Charles Joly (Paris), Emile Rodigas (Belgium), Mrs. Briggs Bury, Mrs. Whitbourn, and Mrs. Wills.

19. The following Table will show the Society's progress in regard to numerical strength during the past year:

DEATHS IN 1902.

		£	s.	d.
Life Fellows .	27 .	0	0	0
4 Guineas .	1 .	4	4	0
2 „ .	29 .	60	18	0
1 „ .	32 .	33	12	0
	89	£98	14	0

RESIGNATIONS.

		£	s.	d.
4 Guineas .	1 .	4	4	0
2 „ .	22 .	46	4	0
1 „ .	124 .	130	4	0
	147	£180	12	0
TOTAL LOSS	236	£279	6	0

FELLOWS ELECTED 1902.

		£	s.	d.
4 Guineas .	6 .	25	4	0
2 „ .	233 .	489	6	0
1 „ .	829 .	870	9	0
Associates .	33 .	17	6	6
Affiliated Societies	26 .	29	8	0
Commutations = £267 15s. 0d.	13 .			
	1140	£1,431	13	6
Deduct Loss .		279	6	0
NET INCREASE IN INCOME		£1,152	7	6

New Fellows &c. . . .	1,140
Deduct Resignations and Deaths	236
NUMERICAL INCREASE . .	904

The total number of Fellows, Members, Associates, and Affiliated Societies is now 6,228.

20. A scheme for the Affiliation of Local Horticultural Societies was put forward a year or two since, and 116 Local Societies have availed themselves of it. In order to enhance the utility of the Society, the Council have caused a Special Card to be prepared suitable for use by Affiliated Societies, for the purpose of granting Certificates or Awards, or for Complimentary Cards of Thanks, Commendation, &c. They have also caused a New Medal to be struck which is to be used by Affiliated Societies only. Details regarding the prices of the Medal and Cards will be found in the book of the Society's *Arrangements*, 1903, or they can be obtained from the Society's Office, 117 Victoria Street, S.W. The Council express the hope that Fellows will now actively promote the affiliation of Local Horticultural or Cottage Garden Societies in their own immediate neighbourhood.

21. It will be within the recollection of the Fellows that in the Report for the year 1899, read at the Annual Meeting held on February 13, 1900, the Council stated as follows :

"The subject of the celebration of the Centenary of the Society is attracting considerable attention. After the consideration of various projects (some of which appear impracticable on account of their expense) the Council recommend the acquisition of a New Garden, as being under all the circumstances the best method of celebrating the Centenary."

The President explained to the Meeting that, after giving the matter the fullest consideration, the Council had come to the conclusion that the provision of a New Hall was not at present financially practicable.

The adoption of the Report was carried unanimously.

At a Special General Meeting held on April 25, 1900, the Council laid before the Fellows a proposal (to give effect to the foregoing recommendation adopted in the Annual Report) to purchase a site for the Garden at Limpsfield in Surrey.

The proposed site did not meet with approval, there being a manifest desire for a Hall; but the following resolution was nevertheless carried *nemine contradicente* :

"This meeting confirms the recommendation of the Council made to and adopted by the (last) Annual General Meeting, viz. : That the Centenary of the Society be celebrated by removing the Gardens from Chiswick, subject to the Council being able to find a new site which recommends itself to the majority of the Fellows."

Acting on this resolution, the Council at a subsequent Special General Meeting, held on April 23, 1901, laid before the Fellows a proposal to purchase land at South Darenth in Kent.

After considerable discussion a resolution was carried "that the proposed site is not the best means of celebrating the Centenary of the Society," and in supporting the resolution Mr. H. J. Elwes, F.R.S., unconditionally offered £1,000 if a New Hall were substituted for a New Garden as the celebration of the Society's Centenary. Mr. A. W. Sutton, V.M.H., and Mr. N. N. Sherwood, V.M.H., also offered £1,000 each ; and Baron Schröder a day or two afterwards offered £5,000 if a New Hall were adopted.

After this Meeting the Council felt bound to carry out the manifest desire of the Fellows to build a permanent Home for the Society as the Celebration of the Centenary, and a Committee was appointed to inquire

into the possibility of securing a suitable site within the means of the Society.

Relying on the already promised subscriptions and the enthusiastic reception with which the appointment of the Committee had been hailed, the Council reported to a Special General Meeting, held on March 21, 1902, that a suitable site had been found in Vincent Square, Westminster. The utmost enthusiasm for the Hall prevailed at this Meeting, which was attended by nearly 300 Fellows; "the principle of building a New Hall" was "accepted," and the Council were "authorised to take the necessary steps to enable the building to be opened in the year 1904," a resolution embodying these words being carried with only three dissentients.

The Council at once took "the necessary steps to enable the building to be opened in 1904," on the completion of the one hundredth year of the Society's existence. The site in Vincent Square was secured by Baron Schröder on behalf of the Society, and after careful consideration Mr. Edwin Stubbs was requested to draw up plans for the buildings in accordance with instructions given by the Council. A subscription list has been opened, to which H.M. the King and H.R.H. the Prince of Wales have been graciously pleased to subscribe, their subscriptions being accompanied by letters of full approval and encouragement. The sum subscribed up to the date of this Report going to press is £22,000, which the Council cannot but regard as a promising commencement. The total estimated cost of the New Hall and Offices is £40,000, inclusive of furniture and equipment. While the Council gratefully acknowledge, on behalf of the Fellows, the response they have already received to their appeal, they feel confident that there are very many Fellows, amateur and professional, who will desire to recognise the great and continuous advantages they receive from the Society by liberally supporting the New Hall Fund.

The Council are aware that the plans and elevation they have placed before the Fellows have been criticised. They desire to point out that they have purposely restricted expenditure on external ornamentation in order to provide satisfactory internal accommodation, and that the Architect has to comply with the restrictions and limitations necessary to meet the requirements of the ground landlords, the County Council, and other authorities.

22. The Council desire to assure the Fellows that the provision of a New Garden has by no means been lost sight of. The Society's lawyers are in correspondence with those of the Duke of Devonshire, and negotiations for the surrender of the Chiswick lease are in progress, and they hope that these, when completed, will materially facilitate the acquisition of the New Garden.

23. At the request of some of the Fellows, the Council have arranged to send (in the week preceding it) a reminder of every Show to any Fellow who will send to the R.H.S. Office, 117 Victoria Street, Westminster, twenty-four postcards, *fully addressed* to himself, or to whomsoever he wishes the reminder sent.

24. The Programme for the ensuing year will be found in the *Arrangements* for the year 1903, lately issued to all Fellows.

25. Subjoined is the usual Revenue and Expenditure Account, with the Balance Sheet for the year ending December 31, 1902.

ROYAL HORTICULTURAL SOCIETY.

CASH ACCOUNT, DECEMBER 31, 1902.

NEW HALL.

	£ s. d.	£ s. d.		£ s. d	£ s. d.
To Cash Received		9,191 15 0	By Preparing Plans		31 10 0
			„ Obtaining Site		211 1 0
			„ Paying-out Tenant		100 0 0
			„ Ground Rent, 1 qr. to Michaelmas, 1902 ...		58 15 0
			„ Stationery and Printing		161 2 0
			„ Advertisements		0 19 6
			„ Sundry Expenses, Bank Charges, &c. ...		3 11 9
			„ INVESTMENTS—		
			August 11, 1902—		
			Exchequer Bonds, £4,000... ... *cost*	4,000 1 0	
			November 5, 1902—		
			Exchequer Bonds, £2,000... ... *cost*	1,997 11 0	
			December 11, 1902—		
			Treasury Bills, £2,000 ... ... *cost*	1,955 5 6	
			Accrued Interest purchased	18 14 9	
					7,971 12 3
			„ Cash at Bank...		653 3 6
		£9,191 15 0			£9,191 15 0

ALFRED HARPER, F.C.A. *Auditor* (HARPER BROTHERS),
Chartered Accountant, 10 Trinity Square, E.C.

ROYAL HORTICULTURAL SOCIETY.

BALANCE SHEET, DECEMBER 31, 1902.

	£ s. d.	£ s. d.
To SUNDRY CREDITORS—		
Chiswick	60 6 1	
Painting Orchid Certificates	48 14 9	
Spottiswoode & Co.	300 0 0	
		409 0 10
„ SUBSCRIPTIONS, 1903, paid in Advance ...	224 15 0	
„ ADVERTISEMENTS, 1903, paid in Advance	14 18 2	
„ FRUIT AND VEGETABLE SHOW, 1903, paid in Advance	13 11 0	
		253 4 2
„ LIFE COMPOSITIONS, Dec. 31, 1901 ...	1,695 12 6	
Do. do. do. 1902 ...	345 4 0	
		2,040 16 6
„ GENERAL REVENUE ACCOUNT—		
Balance, January 1, 1902	11,473 7 0	
Less Bad Debts	3 2 0	
	£11,470 5 0	
„ Balance for the Year 1902, as per Revenue and Expenditure Account	2,488 0 3	
		13,958 5 3
	£16,661 6 9	

	£ s. d.	£ s. d.
By SUNDRY DEBTORS—		
Annual Subscriptions outstanding, estimated at	5 5 0	
Garden Produce	22 13 7	
Advertisements	56 6 0	
Rates and Taxes (Chiswick) paid in advance	25 12 5	
Interest on Investments	128 14 6	
		238 11 6
„ CHISWICK SCHOLARSHIPS—		
Amount Expended	68 15 0	
„ Received	27 1 8	
		41 13 4
„ INVESTMENTS—		
2¾ % Consols £2,122 8*s.* 9*d.* ... ... *cost*	1,892 11 3	
(£2,022 8*s.* 9*d.* of this sum is held by the Society subject to the provisions of the will of the late J. Davis, Esq.)		
2¾ % Consols £5,310 13*s.* 9*d.* ... *cost*	5,268 5 0	
3 % Local Loans £5,800 ... ... „	6,006 16 6	
37,000 Rupees, Indian Rupee Paper... „	2,462 14 4	
		15,630 7 1
„ DEPOSIT ACCOUNT		500 0 0
„ CASH AT LONDON AND COUNTY BANK—		
Current Account	244 15 4	
Petty Cash (Head Office)	5 11 3	
„ (Chiswick)	0 8 3	
		250 14 10
		£16,661 6 9

I have audited the books from which the above Accounts are compiled, and certify that they exhibit a true and correct statement of the position of the Society on December 31, 1902.

ALFRED HARPER, F.C.A., *Auditor* (HARPER BROTHERS),
Chartered Accountant, 10 Trinity Square, E.C.

ROYAL HORTICUL

ANNUAL REVENUE AND EXPENDITURE

Dr.

	£	s.	d.	£	s.	d.
To ESTABLISHMENT EXPENSES—						
Salaries and Wages	901	18	6			
Rent of Office	203	3	0			
Printing and Stationery	392	13	1			
JOURNAL—Printing and Postage	1,808	1	10			
Postages	220	9	11			
Coal and Gas	7	0	10			
Donation to Primula and Auricula Society ...	10	0	0			
„ Carnation Society	10	0	0			
Deputation to Hybrid Conference, New York	150	0	0			
Miscellaneous	162	9	5			
Commission on Advertisements, JOURNALS, &c.	55	12	6			
Painting Orchid Pictures	30	11	0			
				3,952	0	1
„ LINDLEY LIBRARY				36	19	7
„ SHOWS and MEETINGS—						
Rent of Drill Hall and Cleaning	129	9	0			
Temple Show	755	10	10			
Crystal Palace Fruit Show	272	15	3			
Holland House Show	584	15	10			
Labour	108	17	9			
Expenses of Floral Meetings and Conferences	22	5	7			
				1,873	14	3
„ PRIZES and MEDALS—						
Committee Awards &c.				420	14	1
„ CHISWICK GARDENS—						
Rent, Rates, Taxes, and Insurance	268	0	5			
Superintendent's Salary	225	0	0			
Pension, late Superintendent	180	0	0			
Labour	737	13	1			
Implements, Manure, Soil, Packing, &c. ...	133	16	3			
Coal and Coke	240	0	0			
Repairs	15	13	3			
Water and Gas	17	3	4			
Miscellaneous Expenses	74	16	3			
Legal Expenses *re* Assessment...	60	16	9			
				1,952	19	4
„ BALANCE, carried to Balance Sheet				2,488	0	3
				£10,724	7	7

TURAL SOCIETY.

ACCOUNT for YEAR ending DECEMBER 31, 1902. Cr.

	£ s. d.	£ s. d.
By ANNUAL SUBSCRIPTIONS		6,982 15 6
„ SHOWS AND MEETINGS—		
Temple Show	1,367 11 7	
Crystal Palace Fruit Show	241 13 9	
Holland House Show	568 17 0	
Drill Hall Meetings	69 19 0	
		2,248 1 4
„ ADVERTISEMENTS IN "JOURNAL"	503 5 0	
„ SALE OF "JOURNALS"	70 10 2	
MISCELLANEOUS RECEIPTS	36 8 0	
		610 3 2
„ DIVIDENDS—		
Davis Bequest and Parry's Legacy	56 18 4	
Consols	138 12 8	
Local Loans	163 6 5	
Rupee Paper	78 4 4	
		437 1 9
„ INTEREST ON DEPOSIT ACCOUNT		21 17 6
„ PRIZES and MEDALS		51 11 11
„ CHISWICK GARDENS—		
Produce sold	247 5 9	
Students' Fees	31 10 0	
Admissions	4 17 0	
Inspection of Gardens	45 3 0	
Miscellaneous Receipts	44 0 8	
		372 16 5
		£10,724 7 7

ALFRED HARPER, F.C.A., *Auditor* (HARPER BROTHERS), *Chartered Accountant*, 10 Trinity Square, E.C.

GENERAL MEETING.

February 24, 1903.

Mr. H. B. May in the Chair.

Fellows elected (100).—Lady Allen, Mrs. R. Baelz, Nathaniel Baker, J.P., Walter G. Batchelor, Mrs. S. Bateman, Dr. Beale, Brice Beaton, W. H. Bell, Miss G. Binyon, Mrs. C. H. Blount, T. J. Bodenham, Mrs. D. Brand, Lewis W. Bristowe, C. Brodie, Col. Robert Bullock, Mrs. Bijou C. Butt, H. Y. Childs, Sydney Claris, C. E. Clayton, Edward Cockcroft, John Connell, T. H. Cook, W. Courtney, H. G. Cove, S. A. Cragg, G. G. B. Cresswell, Lady Cunliffe, Sir John Dickson-Poynder, M.P., Miss Dowdeswell, W. H. Dumsday, Lady Edwards, G. D. Fairbank, Mrs. Field, Bennett Fitch, David Forbes, Col. S. Frewer, Miss Gillespie, James Girdler, A. Gosheron, Thomas Harrison, N. F. Harrisson, F. C. Heinemann, Arthur Henderson, John Henshaw, Mrs. Hewitt, Mrs. Rowland Hill, Albert Hirst, Dr. De Vere Hunt, Mrs. Jeremy, Hugh C. Knight, Mrs. Knoche, Mrs. Lee, Mrs. Noel Lee, E. Lefevre, E. H. Liddell, J.P., E. H. Lock (S. Australia), Miss M. J. Lock, Claude Lound, Mrs. C. C. Lowe, G. Masson, Mrs. Mathew, H. A. Millington, H. Mitchell, H. B. Murray, John A. Neame, Miss Newton, the Hon. Mrs. Parry-Evans, John Phillips, M.D., Mrs. Potter, R. Pryor, C. E. Richardson, Mrs. Ridley, W. H. Rodman, C. Russell, Lady Constance Ryder, Miss A. E Sandars, R. C. Sanders, Mrs. Secretan, T. W. K. Skelly, E. H. Smart, Lady Smyth, A. E. Speer, Wm. Spencer, W. W. Starmer, Frank P. Telfer, Mrs. E. Tomlin, Hon. Mrs. C. Trotter, John, Turner, Mrs. E. Upton, R. W. M. Walker, Mrs. F. A. Wallroth, Mrs. C. Ward, Miss C. A. Warre, Miss Webster, R. P. Webster, W. C. Wheatley, Tyndale White, H. J. Wigram, C. F. Wood, Baron Anthony de Worms.

Associate (1).—J. Muir.

Affiliated Societies (2).—Petersham Horticultural Society; Sudbury, Wembley, and Alperton Horticultural Society.

A paper "On the Use of Ether and Chloroform in the Forcing of Shrubs," by Mons. Emile Lemoine, was read by the Secretary. (See p. 45.)

GENERAL MEETING.

March 10, 1903.

Mr. George Paul, J.P., V.M.H., in the Chair.

Fellows elected (78).—George Allin, Edward Armitage, Mrs. W. T. Armitage, Mrs. W. T. Armitage, Alan Balch, Walter T. Barker, W. H. D. Barnes, W. L. Bastin, J. S. Brunton, Miss Campbell, D. Campbell-Brown, Lady Harriet Cavendish, Mrs. Godfrey Chapman, A. C. Coxhead, C. J. D. Crews, Miss A. J. Dorman, Mrs. Hornsby Drake, the Hon. Mrs. A. Egerton, Mrs. Ellison, Col. J. P. Fearon, N. J. Fenner, Miss S. Fenoulhet, Miss Amelia Freeland, A. E. Gibbs, Lady Caroline Gordon-Lennox, Thomas Hancock, Arnold G. Hansard, Philip Harris, Rev. A. Harrison, Mrs. Stewart Hodgson, B. F. Hudson, V. B. Johnstone, M.A., Mrs. Kearsley, A. J. King, C. H. Kregor, T. W. Lane, George H. Lawrence, Clement

Le Sueur, Robert S. Lindley, Miss M. Lister, Mrs. Lister, Miss Livesay, Claud Lyall, Mrs. G. Marindin, Mrs. Marshall, Mrs. Massingberd, Mrs. Montgomery, Henry Moore, Francis D. Outram, Mrs. H. Phillips, Wm. R. Phillips, Mrs. C. M. S. Pilkington, Thomas Pimm, Wm. Plender, George H. Pownall, William Riches, Miss E. G. Roberts, Paul Rottenburg, C. A. Smith-Ryland, Mrs. C. A. Smith-Ryland, Mrs. R. Snell, Major L. Stamer, Countess of Stamford, Mrs. B. Stedall, Francis Taylor, Major C. E. Terry, E. Tozer, Mrs. E. Vulliamy, Henry Watson, Rev. J. H. White, W. Montgomery White, W. H. White, Mrs. A. Wilson, Mrs. Winter, Mrs. C. A. Woods, Mrs. H. Woods, A. J. Woodhouse, H. B. Young.

Associates (2).—P. E. Puttock, A. W. Witt.

Affiliated Societies (2).—Heathfield Amateur and Cottage Garden Mutual Improvement Society; St. Andrews (Watford) Parochial Flower Show.

A lecture on "Natural Selection *v.* Adaptation" was given by the Rev. Prof. G. Henslow, M.A., V.M.H. (See p. 71.)

GENERAL MEETING.

March 24, 1903.

Mr. Charles E. Shea in the Chair.

Fellows elected (61).—F. N. Adkin, Mrs. A. B. Albright, E. R. Ashton, J. E. Asquith, Joseph Austin, E. P. Barlow, J.P., Miss E. Barlow, Mrs. Betty, J. T. Binning, Hon. K. P. Bouverie, A. Brown, W. H. Carey, Thomas Clark, L. R. Craddock, F. G. Crampton, F. Cubberley, Lady Mary Currie, Mrs. A. Dupuis, A. Egerton-Leigh, Miss M. I. Evans, Col. Faithfull, T. M. Ferris, Col. A. Garrett, Francis Garrett, Mrs. Gill, D. Parkes Goodwin, Mrs. Cyril Gurney, Miss D. Hannen, A. Harris, H. Herbert, H. I. Hill, Henry Hume, J. King, Lady Knutsford, R. E. C. Le Sueur, J. B. Lewis, C.E., A. Littlejohn, T. Marsh, George Marshall, W. H. Massie, Lady Meysey-Thompson, C. W. Morland, Mrs. Percy L. Pelly, Charles Platt, R. S. Ragg, Miss L. Rhodes, Mrs. Riach, R. Richards, W. B. Rowe, H. Rowley, J. Rushbrooke, Miss Staniland, Gerald Sturt, G. W. Thompson, Rev. H. Townshend-Wilson, Mrs. Trotter, W. Wells, A. E. Clayton Woodhouse, W. H. Wormald, Miss Dora Wright, Charles Yeomans.

Associate (1).—John Mason.

Society Affiliated (1).—Winchester Gardeners' Mutual Improvement Association.

A lecture on "Photo-micrography as an Aid to the Study of Plant Life," illustrated by lantern slides, was given by Mr. F. Martin Duncan.

GENERAL MEETING.

April 7, 1903.

Dr. Maxwell T. Masters, F.R.S., in the Chair.

Fellows elected (61).—W. L. Ainslie, Miss Mary Bayly, Thomas Bladworth, J. M. Bott, B. A. Bower, Rear-Admiral R. F. Britten, R.N.,

Miss A. Budgen, H. Campbell, G. T. Chirnside (Australia), Mrs. Philip Cobbold, George Cotton, Mrs. Morgan Crofton, Hon. Mrs. A. M. Dale, P. W. Dawson, Madame L. de Hemptinne (Belgium), W. Detmar, H. G. Devas, Sir Archibald Edmonstone, Bart., Mrs. Ellershaw, Frederick French, A. C. Galpin, F. G. Gensel, Arthur Gibbs, Miss Gleadow, F. H. Gossage, Miss M. Grant, J. T. Grice, Robert Griffin, Sir H. Michael Hawley, Bart., Mrs. St. John Hornby, Miss L. Johnstone, B. Ladhams, Charles Lamplough. M.D., Mrs. S. Lea-Smith, Miss Letts, Miss Alicia Longman, Edward Lovett, Miss Meysey-Thompson, Mrs. Moore (New Zealand), A. C. H. Nickisson, Charles A. Phillimore, George Pike, Gen. Right Hon. Sir Dighton Probyn, V.C., G.C.B., G.C.V.O., Mrs. Radcliffe, W. M. Read, Mrs. E. Rhodes, Mrs. Kathleen Rickard, W. Ormiston Roy (Canada), Col. Dudley G. Ryder, R. A. Slee, Lady Stewart, Lady Percy St. Maur, A. G. Thomson, R. H. Troughton, G. D. Unite, E. G. Waddilove, R. W. Waters, W. Weaving, Lady Wharton, Mrs. J. H. Wilkinson, Mrs. W. Wilkinson.

Associates (17).—Miss K. Bevington, Miss May Billing, Miss C. Cockburn-Hood, Miss E. F. Davis, Miss M. C. Douglas, Roger J. Dowglass, Miss Adele Eley, Miss A. H. Jaszowska, Miss L. Lovell, Miss E. Row-Fogo, Miss G. Row-Fogo, Miss Edith Seymour, Leslie Seymour, Miss G. E. Villiers-Stuart, Miss M. Wace, Miss Jessie Wilson, Howard Western.

A lecture on "New or little-known Trees and Shrubs" was given by Mr. George Nicholson, A.L.S., V.M.H. (See p. 52.)

GENERAL MEETING.

April 21, 1903.

Dr. Maxwell T. Masters, F.R.S., in the Chair.

Fellows elected (56).—R. Anker, L. H. Blades, Mrs. H. F. Buxton, Countess Cairns, Mrs. W. J. Carr, Mrs. Chalmers, F. C. Stapylton, F. G. Debenham, V. Emmett, John Fleming, C. G. Fothergill, T. G. Frankton, Mrs. McLeod Fraser, Hon. Mrs. H. Gladstone, Marquis of Granby, Miss D. Mary Hadley, Mrs. R. Hartley, C. F. Hartridge, C. E. A. Hartridge, Ashton M. Heath, F. S. Hempleman, Mrs. Leigh Heseltine, Hon. Mrs. Heywood-Lonsdale, John Hitchon, E. J. Holland, H. H. Coldwell Horsfell, J.P., Miss F. M. Hudson, Thomas Jackson, Mrs. Clarke Jervoise, Mrs. Levien, Mrs. Luxford, Mrs. A. Heygate Macmurdo, Mrs. Morison, Mrs. Myers, Hon. Mrs. Mark Napier, W. R. Nash, Mrs. Oxley, Hon. Mrs. A. D. Pennant, E. Rayner, R. H. Rhodes (New Zealand), S. G. Richardson, Lady Evelyn Scott, F. B. Segrues, C. F. Shoolbred, Miss A. Sillem, C. W. Smallwood, W. Smith, W. Stacey, J. Tammadge, Mrs. Thomson, Mrs. Turner, W. Van Sommer, Prof. J. Ward, Sc.D., Mrs. A. Welstead, Mrs. Williams, J. B. Willoughby.

Associates (2).—Miss Florence Bury, Miss M. G. Holmes.

Affiliated Society (1).—Suburban (Cape Town) Amateur Horticultural Society.

A lecture on "Horticultural Education" was given by Mr. R. Hedger Wallace. (See p. 92.)

GENERAL MEETING.

May 5, 1903.

Mr. Harry J. Veitch, F.L.S., in the Chair.

Fellows elected (71).—Alfred Antrobus, John Bagot, Mrs. Birch, F. Lawrence Bland, J.P., F. C. Brading, H. Browning, the Marquis Camden, A. Chandler, Lady Church, Mrs. Cinnamond, Lieut.-Col. Arthur Collins, C.B., the Viscountess Cranborne, the Viscountess Downe, Miss Drake, Hon. Mrs. Arthur Duncombe, F. Eames, H. Fuchs (Johannesburg), Mrs. Gilliat, H. H. Goldfinch, J.P., Mrs. P. D. Griffiths, Miss T. B. Hadwen, Mrs. O. Hawkshaw, Mrs. Horan, F. Impey, R. P. Jones, M.A., Mrs. A. Kempf, H. Knighton-Small, Edward Livock, Mrs. W. E. Long, Mrs. S. Lowe, F. G. McBean, Mrs. A. Macnab, Miss A. E. Martin, Smith Moles, Hon. A. H. T. de Montmorency, M.D., Mrs. R. B. Muir, Wm. Muir, Mrs. G. Mundy, A. H. Naylor, H. F. Newall, Theodore Pauwels (Belgium), Mrs. Peake, Mrs. R. Pearce, Mrs. Leyborne Popham, Mrs. R. Pryor, H. P. Pulleine, the Lady Rayleigh, George Richards, Mrs. Richards, Max. Ring, Walter Robinson, A. Gordon Russell, E. Schaffenius, Dr. Shaw, Thomas Shelly, A. Sherlock, E. R. Smith, G. Soper, Mrs. Stovell, Rev. J. C. Titcombe, J. H. Turner, Mrs. Vandeleur, E. J. Vokes, Lady Walker, F. A. Walton, W. H. Warner, Hugh Warrender, Newton Watson, Miss D. Wild, R. J. Wolton, G. M. Woodrow.

Associates (2).—T. Bones, Miss F. M. Broade.

Society Affiliated (1).—National Carnation and Picotee Society.

A lecture on "Peculiarities of the Cape Flora" was given by the Rev. Prof. G. Henslow, M.A., V.M.H. (See p. 112.)

GENERAL MEETING.

May 19, 1903.

Mr. A. D. Hall, M.A., in the Chair.

Fellows elected (83).—Miss H. E. Agar, Mrs. F. W. Bennett, S. S. Berger, Mrs. J. Stuart Black, Percy Bois, J. W. Chapman, Mrs. Charteris, Mrs. Christie, J. D. Clark, F. Copeman, E. G. Creek, E. M. Crosfield, Mrs. G. Darley, H. N. Davis, Miss Dent, J. Dippie, Cyril Dunell, R. J. Evans, Mrs. Fane, Paul Fanghanel, R. F. Felton, E. Lake Ferraby, G. H. Folkard, E. J. Frost, Miss Leveson Gower, D. Greenway, Thos. Greg, Miss A. C. Harmsworth, William Harris, A. Lister Harrison, Mrs. R. H. C. Harrison, Mrs. Hermon, F. Hope-Jones, J. W. Hopkins, W. A. Horn, Miss Horton, C. J. Howlett, F. Howse, Lady Hunter, Mrs. Warren Jackson, Miss Joicey, G. Kahler, M. C. de M. Leathes, Mrs. B. Lowndes, Mrs. J. A. Mullins, H. Nicholson, Mrs. M. D. Nicholl, Miss W. Orr, Lady Hyde Parker, Samuel Peto, Mrs. F. T. Pitman, Rev. L. Prance, C. Pratley, W. J. Preston, Miss Quain, Major I. M. Rogers, D.S.O., J. H. Rowntree, B. Ruys, Mrs. E. Sandars, Mrs. E. Sartorius, Mrs. T. Schlund, Mrs. Schooles, J. D. Simmons, G. Smith, N. Snell, W. Spinks, Mrs. A. G. Stanton, Capt. J. V. Taylor, W. P. Taylor,

F. Graham Thomson, W. H. Thomson, G. Thornycroft, Edgar Watts, E. A. Watts, Mrs. Whitaker, R. Whitaker, Mrs. R. Whitaker, A. G. White, Mrs. Eyres Wilson, Lady Julia Wombwell, J. W. Wyatt, Lieut.-Col. H. R. Young, W. H. Young.

Associates (2).—W. Shepherd, G. Smith.

Affiliated Societies (4).—Brynderi Horticultural Society; Goring, Streatly, and District Gardeners' Mutual Improvement Society; Tiptree Horticultural Society; Victoria (British Columbia) Horticultural Society.

A Conference on English Tulips took place at 3 P.M. (See page 125.)

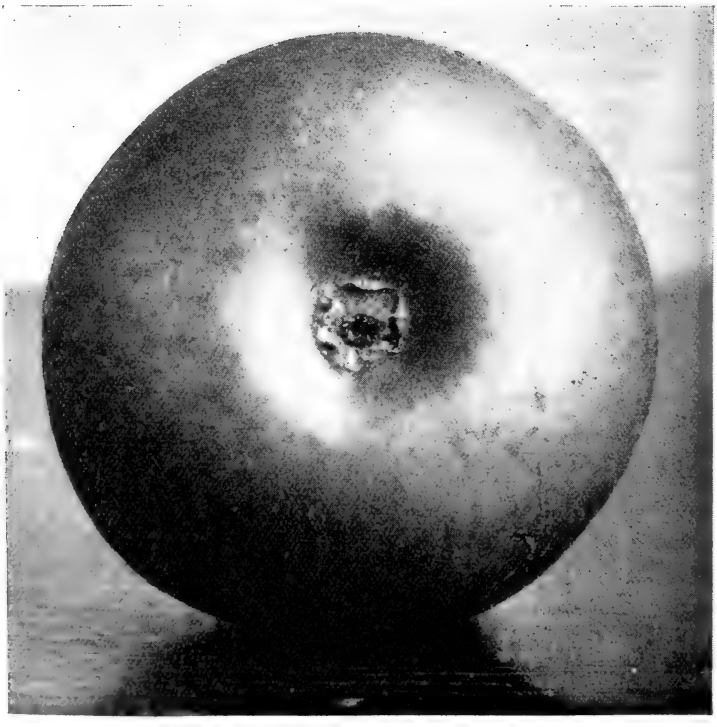


FIG. 42.—APPLE 'CORONATION.'

SCIENTIFIC COMMITTEE.

January 13, 1903.

Dr. M. T. Masters, F.R.S., in the Chair, and eleven members present.

Mezereon dying.—Mr. Holmes showed specimens, and remarked upon the suddenness with which they died off.

Ranunculus arvensis.—Mr. Holmes referred to this plant as said by Sowerby to be poisonous to sheep.

Cedrus Deodara.—Mr. Bowles exhibited a male catkin of this tree, which had become branched, bearing several branches, all being staminiferous.

Pinus Bungeana bark.—Dr. Masters, F.R.S., showed a specimen of the bark of this tree from China, which was silvery-white and scaling off. He mentioned that *Abies arizonica* had a similar bark, both resembling that of the common Birch.

Maize androgynous.—Dr. Masters showed specimens, received from Mr. F. M. Bailey, of Brisbane, Queensland, of which the following were typical examples :—(1) This had one small cob of grains arising from the base of nine male spikes ; single female flowers were scattered at intervals on the latter, both near the bases and summits. (2) Fifteen male spikes had one terminated with a small cob ; isolated female flowers were scattered throughout among the male flowers. (3) This had about twelve male spikes, all being female below and terminated by male flowers above ; the whole formed a dense mass of small cobs, giving the appearance of a proliferous cob with male flowers above.

Practical Pollination.—Mr. Davidson, of Fanners, Wickham Bishops, Essex, described an ingenious method of artificial fertilisation of flowers, as follows :—"I have adopted a method of economising pollen, the ordinary camel's-hair brush being very wasteful. If a stick of sealing-wax be rubbed briskly on the coat-sleeve, as for electrical experiment, and then presented to the flower, the pollen flies to it and adheres. Every particle can thus be utilised far more easily than with a brush."

Climbing Plants.—Mr. Davidson also forwarded the following observations.—"I have had a number of *Hoya carnosa* plants under observation for a considerable time, and (i.) though they twist resolutely enough in one direction during the day, the hours of darkness usually appear to have been a period of indecision, the work of the day being sometimes more or less undone during the night. (ii.) While they are decided enough in twisting their way up living plants, they show no such decision in climbing up dead supports. For instance, if I slightly untwist a *Hoya* from a growing plant, it coils round again in a very short time ; whereas if a stick is substituted for a living plant, the *Hoya* scarcely ever regains its old position without assistance." It was thought by the Committee that this difference was more due to the smooth or rough nature of the surface than to the fact of the support being either alive or dead.

Yucca recurva.—Mr. Worsley sent some leaves upon which Dr. Cooke, V.M.H., reported:—"The leaves of the *Yucca recurva* exhibit long dark streaks, which I have observed before, but could never attribute to any specific form of fungus. In the present instance I have failed to discover any hyphæ or spores, but probably if watched there might be some future development. At present there is no evidence of fungus parasitism, and I do not remember that any has been recorded as affecting the leaves of *Yucca*."

Loganberry Roots.—Mr. F. Sharpe, of Westbury, Wilts, sent some roots bearing nodules, upon which Dr. Cooke reported:—"The nodules on the roots of this plant resemble most of the root nodules which I have examined in giving no definite clue to any parasitism. There is no evidence of the presence of bacteria so far as I can detect (350 diams.), and nothing has resulted from preserving them for twelve days in a damp atmosphere."

Celeriac.—Dr. Cooke reported upon specimens sent to the last meeting:—"Roots marked with discoloured blotches or stains internally, and sometimes in circles or segments, at a short distance from the periphery. The discoloured tissue did not exhibit any trace of hyphæ or anything further than the discoloration of the cell contents. I can see no indication or suspicion of fungus parasitism."

Peas attacked by Grubs.—Mr. Baker brought a sample of wrinkled Peas badly attacked by grubs, upon which Mr. A. W. Sutton, V.M.H., reported:—"There is nothing whatever in the condition of the Peas to indicate any injury beyond that produced by the maggot which is common in Green Peas. It is always the case in shelling culinary Peas that a certain proportion of them are maggoty. The condition of the sample is entirely due to the fact that the wet cold summer greatly increased the proportion of maggoty seeds. Not one of the seeds appeared to be attacked by the Pea-weevil, and wrinkled Peas grown in England are very seldom weevilled. The only Peas of English growth usually attacked are the early round-seeded varieties, and then only in hot dry summers, and when grown on light dry soil. I doubt whether any sample of English Peas of last year's harvest was at all seriously attacked by the weevil owing to the absence of sun and heat."

Statistical Variations.—Prof. Henslow, V.M.H., drew attention to a paper in the *Botanical Gazette*, vol. xxxiii. p. 462, on "The Numerical Relation of the Ray Flowers of *Compositæ*," by Mr. E. Mead Wilcox, in illustration of the mathematical and statistical study of variation as throwing light upon the origin of species. Prof. Henslow expressed his disbelief in any advantage accruing from the statistical method because such statistics are only based on "individual variations," which do not give rise to variations of which systematists can take any account, *i.e.* as long as the plants are living under the same conditions of life. They are merely fluctuating details, due to the qualities of growth.

Scientific Committee, January 27, 1903.

Mr. A. D. Michael, F.L.S., in the Chair, and twelve members present.

Peas attacked by Grubs.—Mr. Saunders gave a further report upon the specimens shown at the last meeting:—"I have examined a considerable number of the damaged Peas, and I cannot say definitely by what insect they have been injured. The weevil (*Bruchus pisi*) certainly is no the culprit. Many of them appear to me to have been attacked by the 'Pea-moth' (*Grapholitha pisana*), but I cannot find any trace of the insect; but that is not to be wondered at, as the moth lays her eggs on the pods when they are quite young, whence the little caterpillars make their way into the pods and feed on the Peas. When full grown they fall to the ground, and become chrysalides in the soil. A few of the Peas were attacked by mites, which were feeding on them in considerable numbers; and it is possible that they were the sole cause of the mischief; but I think not, or I should have found them in a larger proportion of the Peas. The mites no doubt only attacked the Peas after they had been placed in store, and any receptacle in which they are placed should be thoroughly cleansed; scalding is perhaps the most satisfactory method if it be practicable. If any Peas attacked by mites were sown, no harm would be done. Some I examined would not have germinated, but the pest would not spread in the ground. If the Peas were injured by the caterpillars of the Pea-moth, it would be well, if not too late, to bury the top three inches of soil on which they grew as deeply as possible, so as to prevent the moths from leaving the chrysalides later on. The mites had appeared, no doubt, after harvesting."

Weevilled Peas.—Mr. A. W. Sutton, V.M.H., sent specimens for comparison with those just referred to in which the hole was quite irregular in shape, whereas it is perfectly circular if caused by the weevil:—"I send three samples of weevilled Peas as a comparison between these and the maggoty seeds Mr. Baker sent, which may be of interest to the Committee. No. 1 are English-grown early Peas of harvest 1901, with a few of harvest 1900. Both these seasons were exceptionally hot and dry, and it is only in such seasons that we find English-grown Peas at all weevilled. Broad Beans, on the other hand, are much more often attacked by these insects than Peas, but in such a wet cold summer as the last the damage is very slight indeed. In 1900 and 1901 a large quantity of Beans were badly weevilled. No. 2 is a sample of 'wrinkled' Peas 'Champion of England,' Canadian-grown, of harvest 1900. These you will find also show the distinct clean circular opening made by the weevil in its escape from the seed. As I said before, I never recollect seeing a sample of English-grown wrinkled Peas weevilled. No. 3 is a sample of French Sugar Peas, also weevilled, and you will find the dead insects inside some of these seeds. These are of harvest 1901."

Sclerotium on Lilium Flower-stalks.—Dr. Cooke, V.M.H., reported on a specimen sent by Mr. Holmes, having a black Sclerotium on the flower-stalks of *Lilium candidum*:—"In so far as a Sclerotium can be determined, this appears to be the same as one which is common on the stems of *Heracleum* and other *Umbelliferæ*, and which I think was

called in olden times *Sclerotium durum*, when it was also recognised (see Cooke's *Handbook of British Fungi*, p. 601) as the origin of the mould *Botrytis*, or *Polyactis cinerea*. Berkeley described a mould on Lily-stems as *Ovularia elliptica*, for which I afterwards suggested *Botrytis elliptica*. Marshall Ward, in his paper on Lily disease, seems to have made acquaintance with the same mould, which he simply calls *Botrytis*. Massee recently, in JOURN. R.H.S. vol. xxvi. p. 45, figures the mould under the name of *Botrytis cinerea*. Possibly there is only one mould, and that one the old *Botrytis cinerea*. But now, in latter days, this mould is regarded as the conidial stage of a *Peziza*, under the name of *Sclerotinia Fuckeliana*, and perhaps some others; at any rate the little black Sclerotium, the mould, and the *Peziza* are regarded as phases or conditions of one and the same fungus."

Dead Horse Chestnut Trees.—Dr. Cooke reported:—"Since the last meeting I have been consulted as to the death of some old Horse Chestnut trees in Greenwich Park, which has been caused, it is confidently affirmed, by a fungus which appears externally on the bark, and internally in a plentiful mycelium, between the bark and the wood. The species credited with this destruction is *Stereum purpureum*, although, so far as I am aware, neither Hartig nor any other of the German authorities on the parasites of forest trees has mentioned the species as suspected of causing disease or death. It is generally recognised that the yellow *Stereum hirsutum*, which is so common on all dead wood as a saprophyte, is capable also of becoming parasitic, and entering by wounds in the bark, causing destruction of living trees. Hence it is not so improbable that *Stereum purpureum* may also be capable of becoming a parasite. Another phase of this subject is interesting. Not long since it was brought to the notice of this Committee, JOURN. R.H.S. vol. xxvii. pp. 713, cxliii, cxlix, that a paper had been published which contended that this same fungus was the cause of 'silver-leaf' in stone-fruit trees."

Araucaria Bidwillii Cone.—Mr. F. Bull, Southport, sent a cone. The tree is about forty feet in height. Dr. Masters observed that it fruited at Kew in 1873 (*Gard. Chron.* 1873, p. 561, fig. 73). As the tree requires a great deal of space, it is not likely that there are many specimens outside botanic gardens. The seeds are eaten by the natives of Australia.

Campanula rotundifolia diseased.—Mr. Worsdell exhibited specimens in which the flower-buds were attacked by *Cecidomyia campanulæ* and presented a swollen appearance.

Pelargonium Stipules, Use of.—Mr. Davidson, Fanners, Wickham Bishops, Essex, described an experience indicating a special use of these organs:—"Some time ago I was struck with the 'nursing' properties of the stipules of Pelargonia, which, when grown cold in winter, lose their leaves. If for the sake of tidiness the withered stipules are also removed, the buds are very slow to break in spring; but if the stipules are left on, the buds break much more readily; a fact which I found to be due to their holding moisture, and thus softening the skin. Darwin has observed that stipules sometimes serve to hold water."

Club-root in Cruciferæ.—In reply to a question as to remedies Mr. Massee wrote:—"The germs are hungered out if the soil is kept free from cruciferous plants—cultivated and wild—for four years, their exit

being hastened by the use of lime. As it would be at least inconvenient to cease growing 'greens' for such an extended period the following plan might be adopted. As much quicklime as is compatible with healthy growth of Turnips, Sprouts, &c. should be intimately mixed with the soil to the depth of six inches to eight inches. Just now (the end of January) is the time for this, as the germs will soon begin to be on the run. If gaslime is used, a layer about one inch thick, sprinkled on the surface, should remain for four weeks, and then be pointed into the upper six inches of soil. No planting should be attempted until after the gaslime has been on the soil for at least six weeks. The great bulk of plants are inoculated when quite seedlings, and those that escape for the first six weeks of their existence do not, as a rule, become diseased when planted in infected soil." Mr. Baker added some interesting remarks upon his experience. He said that a badly infected soil should have all cruciferous plants rigidly excluded for four years; and Shepherd's Purse, which is very liable to be attacked, should be entirely weeded out. The fungus could not cross a narrow path, but could easily be transmitted by garden implements or by the boots of the workmen. Superphosphates were rather favourable to the growth of the fungus, whereas basic slag was less so. Mr. Worsley had found gaslime to have been quite effective. Mr. Wilks recounted how, having suffered very severely in 1901, he had put on a layer of gaslime four inches thick in December and left it till the middle of February, when it was forked in, and Cabbages planted on the land afterwards were as badly affected as ever.

Ismene calathina, Bulb germinating.—Mr. Worsley observed that in the germination of the seeds of this plant, before any leaf-growth takes place, it forms a bulb and continually loses moisture, so that its weight diminishes from that of the seed to the extent of seventy-five per cent.; so that while ten seeds weigh one ounce it requires forty-four of the small bulblets to weigh that amount. Besides the loss of water, it is known that all seeds lose weight in other ways.

SCIENTIFIC COMMITTEE, FEBRUARY 10, 1903.

Dr. M. T. MASTERS, F.R.S., in the Chair, and fourteen members present.

Soil with Mycelium.—A sample sent by Mrs. Gamwell proved to be "thoroughly permeated with the white mycelium threads of some fungus," but Dr. Cooke added that "it is impossible to say what its future development might be. It is certainly destructive to vegetation of any kind."

Gelatinous Substances.—Dr. Cooke reported that "the nostoc-like substances sent by Mr. Bird exhibited no organic structure whatever affording any clue to its origin."

Eelworms.—Mr. D. A. Voss, South Norwood, sent the following communication:—"Twelve houses, each 200 feet by 20 feet, used for growing Cucumbers and Tomatos, have become infested with eelworm. The soil to the depth of 3 feet has been removed already from several of these, and in one or two the surface left exposed thereby has been dressed

with lime and soot. I feel that the simple removal of the soil may leave in isolated spots some source of infection, which may lead in a short time to the whole labour expended being wasted, and I shall be glad of any advice as to the most satisfactory and effective way of avoiding this. It is not convenient to either change the crop grown or to allow a long period of idleness." Mr. Odell reported :—" To prevent recurrence of this pest drastic measures must be taken to destroy the eggs of the eelworm (*Tylenchus*) ; merely dressing the bed with lime and soot will not be effective. (1) The whole of the brickwork inside the house should be scrubbed with a hard brush and strong soda water, afterwards limewashing the same. (2) All barrows, baskets, and other tools used to take out the old soil should be treated as infectious and thoroughly cleansed. (3) The soil used for refilling the beds should be as fresh as possible ; soil standing or stacked near the houses should not be used. (4) Avoid stable or farmyard manure for a time if possible ; use artificial manure instead. It should be remembered that organic manures are frequently a source of infection, as the nematodes can pass uninjured through the intestines of an animal fed on infected fodder. The leaflet of the Board of Agriculture on the knot-disease caused by eelworms advises that the interior of the house should be washed with carbolic acid one part and water eight parts. This, I should think, would be more effective than the strong soda solution recommended."

Apple Stem decayed.—Mr. S. Sharp, Westbury, Wilts, sent a shoot decayed and apparently attacked by *Nectria ditissima*, a fungus which attacks wounded places, and, as Dr. Cooke observed, having once penetrated the wood there is no cure, as it spreads through the wood.

Grubs in Soil.—Specimens were sent by Miss Edlmann, Chislehurst, upon which Mr. Saunders reported :—" The grubs (so called) proved to be of two kinds : those which were most numerous had unfortunately become chrysalides, so that it is impossible to name them with any certainty. I believe that they belong to the family *Bibionidæ*, the same family to which the very common flies called St. Mark's flies belong—they are so named because they are often found flying about in large numbers on or about St. Mark's Day (April 25). They are perfectly harmless as flies, but as grubs they feed on the roots of plants, and are the cause of much injury. There were also two specimens of the 'galley-worm,' *Polydesmus complanatus* (one of the myriapods nearly allied to the *Julidæ*), which are most destructive creatures. Insecticides have little or no effect on them, but they may be trapped by burying small slices of Turnip, Mangold, or Carrot just below the surface of the soil near the plants they are attacking. A small wooden skewer should be stuck into each, so as to show where they are buried : these traps should be examined every morning.

Saxifraga Burseriana diseased.—The Rev. C. Wolley Dod wrote :—" I send some badly diseased plants of *Saxifraga Burseriana Boydii*. This disease had nearly extinguished my stock of this variety, and I have not found any effectual remedy. It has been progressing for three or four years. Some other varieties of *S. Burseriana* are attacked by it, but less generally."

Bulbs with dying Roots.—Dr. Voelcker inquired on behalf of a lady

who found that bulbs of Roman Hyacinths, Freesias, and Daffodils, after being potted and placed in a greenhouse, were apparently growing well, but of which the roots were almost entirely absent. Rev. W. Wilks observed that this was due to the bulbs not having been allowed to make roots in the dark or, better, buried in Cocoanut fibre or ashes for a month or six weeks before being exposed to the light. In the present case the shoots were living at the expense of the bulb only, and not having made sufficient roots for support were being starved.

Calanthe rapid flowering.—Mr. Odell called attention to the very short time in which a plant exhibited had taken to blossom, for it was sown only eleven months ago.

Calanthes, Hybrid.—Dr. Masters, F.R.S., showed purple and white flowers received from Mr. Chapman, who wrote :—" The hybrid Calanthes ' Sibyl ' (pure white) and ' Oakwood Ruby ' (the deepest coloured variety in cultivation) were both obtained from the same pod of seed, the original cross being *C. Veitchii* and *C. rubro-oculata*. From selections of the best varieties derived from this batch of seedlings and intercrossing amongst themselves, and continuing the inbreeding for four or five generations these remarkable results, ' Sibyl ' and ' Ruby,' had been obtained. This is interesting at the present moment, seeing that ' Mendel's Laws of Inheritance ' have been placed so prominently before the Fellows of the Society. It certainly goes far enough to prove that, instead of reversion to the original crossing by the process of inbreeding, the result has produced and placed before us the widest possible variations from the original cross and from each other, showing that ' Mendel's Laws ' cannot be applied in the way some of our prominent specialists have indicated. It may be interesting also to state what effect in-breeding has had upon the constitution of these plants. It is impossible to describe the diminished size of the bulbs while the general constitution of both varieties is exceedingly delicate. ' Oakwood Ruby ' I consider the most difficult subject to cultivate among the whole genus of *Calanthe* ; I regard it as one of the most difficult Orchids I have ever had to deal with. I hope before the season is over to place before the Committee other results of inbreeding of Orchids, which, I think, will go far to prove the inapplicability of ' Mendel's Laws ' to Orchids."

Chinese Primrose Ivy-leaved.—Dr. Masters showed drawings of this variety taken in 1887, the leaves being lobed like those of an Ivy and the flowers being remarkable for having only four petals and abortive organs. It appears to be precisely the same now, not having advanced at all.

Cypripedium synanthic.—Dr. Masters also showed drawings of the flower of *Cypripedium villosum* having six stamens and two stigmas, the sepals being multiplied. The appearances were due to the fusion of two or three flowers into one.

SCIENTIFIC COMMITTEE, FEBRUARY 24, 1903.

Dr. M. T. MASTERS, F.R.S., in the Chair, and fourteen members present.

Chrysanthemum diseased.—Mr. Michael reported on specimens sent that there were only one or two aphides, but sections showed abundance of eelworms, which had caused the injury.

Cypripedium Fairieanum Hybrids.—With reference to the fact that hybrids of this plant refuse to cross with each other, Mr. J. Douglas, V.M.H., sent the following communication:—"Some remarks were made at a recent meeting on crossing Cypripediums, and a misunderstanding arose thereupon. It was stated as a fact, and so far as I am aware the statement is correct, that hybrids of *C. Fairieanum* will not cross with each other. *C. Fairieanum* is so scarce a plant in Britain that with the exception of a small plant in the collection of the President of the Royal Horticultural Society I am not aware of any other. Consequently hybridists are anxious to obtain seedlings with as much of the character of this scarce variety as possible. They have made many attempts by recrossing the *C. Fairieanum* hybrids in existence, but have always failed, although other hybrid Cypripediums will cross with *C. Fairieanum*. For instance, *C. œnanthum superbum* crossed with *C. Fairieanum* produced a very scarce and beautiful variety, 'Baron Schröder'; *C. vexillarium* was obtained by crossing *C. barbatum* with *C. Fairieanum*, and this hybrid on being crossed with *C. bellatulum* produced *C. bellatulo-vexillarium*, but *C. vexillarium* was the pollen parent. The object of bringing this matter before the Committee is to ascertain why it is that, if other hybrid Cypripediums will cross with each other, *C. vexillarium* will not cross with *C.* 'Niobe,' or why *C.* 'Juno' will not cross with *C. Arthurianum*, or any other of the numerous ways in which the *C. Fairieanum* hybrids may be crossed with each other. The pollen is potent enough if used on other species of Cypripediums."

Parasite on Daphne Mezereum.—Dr. Cooke sent the following report: "The mould on twigs of *Daphne Mezereum*, brought by Mr. Holmes on January 13, consists of dense tufts of *Polyactis* with coloured hyphæ and elliptical spores, probably *Polyactis cana*. In each instance there appears to have been a wound in the bark, upon which the mould became established, but originally it was saprophytic in its habits. Like others of the genus, it may become parasitic, but in this instance there is no indication of its having injured the plant whilst sound, but to have attached itself to wounds already existent."

Alcohol from Sawdust.—Mr. A. Rickmann wrote to inquire for information as to the probable cause of the difference in the behaviour of Pine and Oak wood sawdust in Europe and in America. The process of the manufacture of alcohol from it being identical, the result was that 40 per cent. less of alcohol was obtained in the United States than at Aix-la-Chapelle. The names of the trees of which the wood was employed were not mentioned, but the Committee agreed with Mr. Rickmann's suggestion, that "the American wood must be in its component parts different from wood grown in Europe, in a similar manner as American

Wheat is different from English Wheat." The cause of the difference could only be discovered by separate analysis and experimental tests.

Carnation Cuttings dying.—Mr. E. H. Jenkins sent some cuttings, the upper part of them dying. The cause was pronounced to be the hard stem (not sufficiently herbaceous), which resulted in insufficient root action. The damp weather had possibly encouraged leafy growth, so that the main shoot was drained of its supply of sap. There was no disease present.

Mendel's Principles applied to Calanthe Hybrids.—Mr. C. C. Hurst sent the following communication on this subject:—"With reference to the hybrid Calanthes 'Oakwood Ruby' and 'Sibyl,' sent to the last meeting, and to the expression of opinion that they 'prove the inapplicability of Mendel's laws to Orchids,' if the pedigree of these two hybrids is correctly recorded in Mr. Chapman's notes, it seems quite clear that we have in them a typical Mendelian case, and that Mr. Chapman's opinion to the contrary must be due to a misunderstanding of the Mendelian principles. According to Mr. Chapman's notes, 'Oakwood Ruby' (with darkly coloured flowers) and 'Sibyl' (with pure white flowers) were raised from the same capsule with the following pedigree, which, for the sake of simplicity, I have reduced to Mendelian terms:—

First generation.

C. rosea × *C. vestita* = C. × *Veitchii* vars.
Rose × White = Light rose to deep rose-carmine.
Dominant × Recessive = D.R.

Second generation.—D.R. × R. = 1 D.R. + 1 R.

Third generation to seventh generation.—D.R. × D.R. = 1D + 2 D.R. + 1 R.

In this case, therefore, by continued selection of the darkest D.R.'s in each generation, the seventh generation produces the darkest variety, 'Oakwood Ruby' (D.R.), and also the pure white 'Sibyl' (R.), which is in strict accordance with the Mendelian expectation. Further, according to the Mendelian principles, 'Oakwood Ruby,' being an impure Dominant (D.R.), should, when self-fertilised, continue to throw dark forms, rose forms, white forms, and all intermediate colours; while 'Sibyl,' if a pure Recessive when self-fertilised, should throw whites only. Here, then, is a fine opportunity for Mr. Chapman, with his well-known cultural skill and his Oakwood advantages, to test Mendel's principles by actual experiment."

Cineraria diseased.—Some plants were received from Mr. C. Buckland, Braintree. Mr. Saunders reported:—"The plants were in a very sad condition; the leaves were infested by green-fly, and the roots with one of the *Poduridæ*, or Springtails, I believe by *Lipura ambulans*, which were present in large numbers, and by some small worms belonging to the family *Enchytræidæ*, which are nearly related to the true earthworms. They were very abundant, particularly at the base of the roots. They die almost instantly on being placed in limewater, so that they would easily be destroyed by soaking the soil in which they were with limewater; but whether they would be reached by watering when on the roots close up to the

stem I cannot say. Both the worms and the Springtails are very injurious to plants ; the latter do not appear to be much affected by limewater. Probably a strong solution of nitrate of soda or common salt would have more effect on them, but I do not know of any experiments that have been made on them."

Azaleas and Fumago.—Mr. Mortimer sent samples attacked by the common *Fumago*, probably due to a too close atmosphere. A good washing would be desirable in such cases. They had also been attacked by Thrips.

Arctic Garden at Kew.—A suggestion was sent that an "arctic house" should be formed at Kew, "wherein Dwarf Willows and other curious vegetation of the polar regions might be seen associated with some pretty effects of snow and ice, which might be produced in summer." It was observed by the Committee that arctic plants grow better in temperate climates than in the arctic regions, as *Papaver nudicaule*, which is found in Spitzbergen, and that many of them are now growing in Kew Gardens, so that the addition of a "cold house" of this character would be superfluous.

Cyclamen monstrous.—Mr. A. W. Sutton, V.M.H., sent a plant with one or two of the flowers having a foliaceous bract below it, a not uncommon occurrence, inquiring if it is likely to be perpetuated. Mr. Gordon observed that he found a considerable percentage of seeds raised from flowers thus provided with a leafy bract were reproduced ; but if it were cultivated, as Mr. Sutton observes, "one flower stem would give an almost perfect buttonhole of a flower and leaf together."

Stone embedded in a Tree.—Rev. A. Harvey, Shirehampton, sent a photograph of a portion of a root of an Ash tree. It was cut down in 1870. The root had grown entirely over so as to envelop the stone.

Conifers.—Dr. Masters, F.R.S., exhibited a large series of cones of various species from Westonbirt, as well as several of the novelties discovered in Central and South-west China by Mr. Wilson when collecting for Messrs. Jas. Veitch, explaining their localities and other details.

Scientific Committee, March 10, 1903.

Dr. Masters, F.R.S., in the Chair, with eighteen members present, and Mr. de B. Crawshay, visitor.

Scientific Investigations.—Dr. Masters, F.R.S., proposed the following resolution, which was seconded by Mr. Shea and carried unanimously :—That in the opinion of this Committee it is desirable that a department should be established in connection with the Society's Gardens for the conduct of original research, experiment, and investigation on matters having an important bearing on practical horticulture. The Committee are further of opinion that this department should be placed under the management of an adequately paid and competent scientific man, acting under the direction of the Council, and in co-operation with the Superintendent of the Garden.

The Committee will be pleased to offer suggestions as to the nature

and kind of work to be undertaken, and generally to afford any assistance in their power towards the carrying out of this proposal.

The subjects brought under the notice of the Committee at their meetings afford very numerous suggestions as to the kind of work which might be done at Chiswick. The following may be mentioned by way of illustration :—

(i.) The employment of the electric light for forcing purposes.

(ii.) The use of ether in hastening the development of flowers.

(iii.) The use of hydrocyanic acid vapour for the destruction of the Currant-bud mite.

(iv.) Experiments on the use of insecticides and fungicides, as, for instance, in the diseases of Tomatos and Cucumbers, wherein there is great present need for a cheap, easily prepared, non-poisonous substance fatal to eelworm and fungi in the soil, but which might be used without injury to the growing plants. The discovery of such a remedy would obviate a pecuniary loss that may now be reckoned as extremely large.

(v.) The discovery or the raising of particular varieties which may be proved to be more or less immune to the attacks of insects and fungi.

(vi.) Investigations into the nature and cause of canker in Apple and other fruit trees.

(vii.) Investigations as to the circumstances favourable or otherwise to the spread of epidemic diseases, such as the *Cercospora* of the Cucumber and the Melon.

(viii.) The supposed action of aphides, thrip, mites, and other creatures in spreading disease by alternately feeding on healthy and on diseased plants.

(ix.) Experiments with various manures on the growth of plants, especially with the view of ascertaining the special effects at particular stages of growth.

(x.) Special trials of all absolute novelties, whether of flower, fruit, or vegetable, apart from mere trifling variations of those already well known.

(xi.) Experiments on the influence of an increase of the carbonic acid of the air on the growth of plants.

Larch Trees.—Mr. Elwes, F.R.S., observed that one subject especially which might be investigated at Chiswick, as being most important for forestry, was the diseases of Larches. It was said that the spores of *Pezzia* enter the wounds made by *Chermes*, and that it appeared some trees are more or less able to resist the *Chermes*. Hence, if such a race could be established, it would greatly assist cultivators, who might be able to grow valuable trees of this kind.

Assimilation.—Dr. Horace Brown, F.R.S., alluded to experiments at Kew in which he had investigated the results of increasing the amount of carbon dioxide in the air. The assimilation was doubled by an increase of pressure. Further experiments, he thought, might prove to be of great practical value.

Pelargonium Disease.—Dr. Cooke reported upon leaves sent by the Ven. Archdeacon Meredith, Tibberton, Newport, Salop :—" Two leaves of Pelargonium submitted were spotted indistinctly, and in one instance

with an appearance of rotting, as caused by the rot moulds. It is reported that the disease appears on this variety only 'like blisters on the young stem and cracks on the older wood; the leaves are attacked by these spots, which soon cause them to wither.' The leaves sent were closely crushed and compressed, so that all trace of any delicate mould, if present, would have been destroyed. Examination of the spots under the microscope exhibited no trace of mycelium or spores; stems not seen. From the specimens sent no evidence can be found of fungus parasite, otherwise the appearance would suggest the attacks of a *Peronospora*, of which one species is known in Germany and Belgium to attack wild species of Geranium. Possibly it might prove to be the early stage of one of the white moulds, such as *Ramularia*, but it has not the appearance of *Ramularia Geranii*. At any rate the leaves sent afford no evidence from which to determine the disease.

Copper in Soil.—With regard to the specimens of soil sent by Mr. A. Gaut, Yorkshire College, Leeds, in which some fruit trees grew, the leaves of which were annually of a golden colour, Dr. Voelcker reported:—"Both the top and subsoil contain distinctly material amounts of copper; the top soil ·046, and the subsoil ·265 per cent. of copper oxide (CuO). Further I ascertained that the copper is in the insoluble condition. There is no copper removable in a water solution in the ordinary way."

Calanthes and Mendel's Law.—Mr. Chapman forwarded the following reply to Mr. C. C. Hurst's observations reported at the last meeting:—"I am not at all surprised to find Mr. C. C. Hurst claiming the fact of 'Oakwood Ruby' and 'Sibyl' having been derived from the same seed-pod as bearing directly on the action of Mendel's Law. Had the rose or rose-carmine characteristics been maintained, Mr. Hurst might have been sure of my support of the principles of which he is such an able advocate. Let us see what has really taken place. The first cross produced *C. Veitchii* from *C. vestita* and *C.* (*Limatodes*) *rosea*; the second cross was between *C.* × *Veitchii* and *C. vestita rubro-oculata* (giving a second cross with *C. vestita*) and produced *C. Cooksoni*, with a yellow eye or disc, also *C. Alexandri*. Here the first change takes place. The deep ruby eye as seen in *C. vestita rubro-oculata* is removed to the front lobe of the lip and each of the petals, the sepals only being white, in some cases slightly tinted with the colour of the petals. It is remarkable to note that the rose or rose-carmine colours have disappeared. I cannot get at the exact parent that was used in the next generation, but I gather that the darkest varieties were selected and crossed with each other until the remarkable variation between 'Sibyl' and 'Oakwood Ruby' was produced. In the latter case the flower of *C. vestita rubro-oculata* had been turned inside out. I cannot trace any of the rose or rose-carmine of *C. Veitchii*, or the shape of *Limatodes* in the flower, as seen in *C. Veitchii*, but in the bulb the shape and general structure resemble *C.* (*Limatodes*) *rosea*. I cannot see what advantage can be procured by intercrossing 'Oakwood Ruby' with 'Oakwood Ruby.' I cannot expect to gain more from this than I procured nearly six years ago when crossing *C. Veitchii* with its own pollen, and the result was that it reproduced itself from seed. I might add to this another instance in

which I procured a primary crossed hybrid from seed. Nearly ten years ago I crossed *C. Leeanum* (a very fine form of it), and the result brought its parent, with no more variation than constitutional or cultural conditions are capable of bringing about. With such clear results as these I at least cannot see where the application of Mendel's Laws comes in."

Trees in Park Lane.—Mr. Saunders showed photographs of some trees the trunks of which exhibited a knotted appearance. Mr. Elwes, F.R.S., observed that Oaks frequently showed the same feature up to ten or more feet in height. The general opinion was that it was the result of numerous embryo buds, and that there was no fungus causing it, though similar excrescences often result from insect punctures.

Placea lutea.—Mr. Worsley showed germinating seeds of this plant, and described how the radicular end of the embryo first rises upwards and then turns downwards, producing a (probably temporary) axial root. The cotyledon rises in a loop, like that of an Onion, the tip being retained in the endosperm till it is exhausted. Mr. Elwes noticed that the seeds would only germinate at such time as the adult plant would throw up its foliage.

Hippeastrum Hybrid.—Mr. Worsley showed a cross between *H. vittatum* and *H. subbarbatum*, the red colour of the male being replaced by pink in the hybrid. He observed that this illustrated the prepotency of the "erraticism" of the female parent, in that the offspring bore the "red tips and feathering" of the female, instead of being strictly intermediate in character.

Hymenocallis Hybrid.—Mr. Worsley showed flowers of a hybrid between *H. Augustina* (female) and *H. Moritziana* (male) in which the flowers agreed with the former, and the foliage with the latter. A curious feature was a correlation between an increase in the number of ovules, and the flower having more perianth leaves than normally.

Euonymus and Caterpillars.—Mr. Carter, Pelham Crescent, inquired as to the best method of dealing with the caterpillar which attacks the *Euonymus*. Mr. Saunders replied:—"The caterpillars on *Euonymus* are those of the 'magpie' or 'Gooseberry and Currant moth' (*Abraxas grossulariata*), a very common insect, which may often be seen fluttering about during the daytime. It flies very badly. The general colour of the insect is creamy-white ornamented with black spots; but they vary much in colour, some nearly white specimens having been found, and others which were almost black. The insect measures $1\frac{1}{2}$ in. to $1\frac{3}{4}$ in. across the open wings. The chrysalides are not made in the ground, but in dead leaves, which they spin together, or in some similar kind of shelter. Any leaves which do not fall with the others should always be examined, as it will be often found that the caterpillar has spun the edges together, and attached it to the bush, and has undergone its transformations within it. Picking the caterpillars off by hand is no doubt one of the most effectual ways of dealing with this insect, but it is tedious; spraying the bushes with a solution of paraffin emulsion would probably kill a large number. In the winter all the dead leaves beneath the bushes should be collected and burnt. The moths may be caught very easily in a butterfly net." Mr. Druery, V.M.H., observed that he had

tried dusting with Hellebore powder freely into the web-colonies, and that it was effectual in destroying them.

Reversion in Hybrids.—Mr. de B. Crawshay instanced a case of reversion in *Odontoglossum crispum* × *O. c. Crawshayanum*. The flowers were crossed in 1895, sown in 1896, and bloomed in 1903. He added the following remarks:—"A seedling raised from a fine *Odontoglossum crispum* ♀ crossed by *O. c. Crawshayanum* ♂, which has blotches on the sepals and petals ¾ in. long, of deep purple brown. The seedling has no blotch or spot, save three extremely small ones in two of the four lips (four blooms). Absolute reversion has occurred both in form and absence of blotch. The form is as bad as bad can be. Hence I deduce that my contention of years' standing, that a true *crispum* is white and unspotted, has been proved by the first plant to bloom, which has reverted beyond all possible expectation. The blotching of a so-called spotted *crispum* is, I contend, the remains of hybridity. This, I consider, is, in some way of Nature's own, acquired from *O. luteo-purpureum*; and as these blotches are therefore adventitious, they fail to transmit their characters to the resulting progeny; *ergo* the spotted crispums are not pure crispums at all, but hybrids or crosses."

Cypripedium Crosses.—Specimens of *Cypripedium* × *Actæus* were exhibited by Mr. J. Douglas, V.M.H., to illustrate the reversion of Orchids. *C. Actæus* was raised by crossing *C. Leeanum* with *C. insigne Sanderæ*, the last-named variety being totally different from any other variety of *C. insigne*, as it lacks the large spots on the dorsal sepal. *C. Leeanum* was obtained by crossing *C. Spicerianum* with *C. insigne Chantini*, and the reversion consists in the fact that one variety of *C. Actæus* was almost a replica of the original form of *C. insigne Chantini*, from which *C. Leeanum* was produced. Many of the other forms—indeed, nearly all of them—might be described as good varieties of *C. insigne*.

SCIENTIFIC COMMITTEE, MARCH 24, 1903.

Dr. M. T. MASTERS in the Chair, and fourteen members present.

Orchid Seedlings.—Mr. Duncan inquired if 'Springtails' (*Podura*) were injurious to Orchid seedlings, as he had some which were injured just above the ground. Mr. Saunders observed that such was undoubtedly the case. Mr. Bidgood said that he had found a very weak solution of rectified spirit (½ to 1 per cent.) was effective, applied two or three times a week to the growing plants.

Fruit Industry.—A communication was received from the Board of Agriculture asking for opinions upon proposed legislation for the protection of the fruit industry in this country. It was referred to a sub-committee, consisting of Messrs. Shea, Saunders, Massee, and Dr. Masters, to report.

Mendel's Law. Mr. C. C. Hurst sent the following interesting description of Mr. Chapman's Orchids, showing how the Mendelian Law was exemplified by them.

Mendel's Principles and Orchid Hybrids.—The additional facts, presented by Mr. Chapman at the last meeting, respecting the hybrid

Calanthes 'Sibyl' and 'Oakwood Ruby' are very valuable and interesting, and show still more clearly the application of the Mendelian principles to Orchid hybrids. The fundamental principles of Mendel are three, viz.—(1) the purity of the Dominants (D), (2) the purity of the Recessives (R), and (3) the impurity of the DR's. In the case of the *Calanthe* hybrids in question, according to Mr. Chapman's own facts, each of these three principles is illustrated, viz.—(1) "In the bulb (of *C.* × 'Oakwood Ruby') the shape and general structure resembles *C. rosea*," i.e. a *pure Dominant*. (2) The flowers of *C.* × 'Sibyl' are pure white, *i.e.* a *pure Recessive*. (3) The flowers of *C.* × 'Oakwood Ruby' are "dark coloured," having been gradually intensified by selection of the darkest forms (DR's) through four or five generations, i.e. *impure DR's*.

With regard to the hybrids *C.* × *Veitchii* and *Paphiopedilum* × *Leeanum*, which Mr. Chapman says he has raised true from seed, and which he believes are therefore exceptions to "Mendel's Laws," allow me to assure him that such well-known cases are not at all inconsistent with the Mendelian principles. As I showed in the JOURN. R.H.S. (1902), xxvi. pp. 688–695, the hybrid *P.* × *Leeanum* in each single character varies between its parents *P. insigne* and *P. Spicerianum* in every degree of blending, presenting a perfect series of forms.

So that if A represents *P. insigne* and B represents *P. Spicerianum* the apparent result in *P.* × *Leeanum* is 1A + 2AB + 1B.

According to Mendel's principles, if *P.* × *Leeanum* be self-fertilised the actual result is apparently the same, viz. 1A + 2AB + 1B.

So that one can quite understand Mr. Chapman's self-fertilised hybrids coming apparently true from seed.

The real difference between *P.* × *Leeanum* and its own offspring is, of course, that, according to the Mendelian principles, in the latter case the A's and B's would breed pure in the next generation, while in the former case the A's and B's would breed impure AB's, though on the surface both would appear to be the same.

Many other interesting problems are suggested by Mr. Chapman's facts; *e.g.* it seems possible that the weak constitution of *C.* × 'Oakwood Ruby' might be due to the correlated "bulb structure" being a pure Dominant, i.e. *C. rosea* (a well-known miffy subject) rather than to the intrinsic effects of inbreeding, as suggested by Mr. Chapman. But space will not allow these matters to be followed up here, and I propose, with Mr. Chapman's kind assistance in the way of material, to examine these *Calanthe* hybrids in detail when they flower again, and report the result in the Journal of the Society.

To this Mr. Chapman replied :—

"I am unable to follow Mr. C. C. Hurst in the matter of Dominant and Recessive, characteristics in respect to the *Calanthe* hybrids. The colour in *Calanthe* 'Oakwood Ruby' should, I think, be a pure Dominant. When we consider that *C.* (*Limatodes*) *rosea* was rose to rose-carmine, and that the dominating characters of the rose and rose-carmine have been intensified in future generations, I am unable to discern where the recessive characteristics apply. That the colour of *Calanthe* 'Oakwood Ruby' is Dominant and of a fixed nature is shown in the only cross that has yet flowered from its influence, viz. *Phaio-Calanthe* 'Ruby.'

"If Mendel's Laws are sufficiently elastic to account for and include the varied characteristics to be derived in hybrid Orchids, the utility for practical purposes, I fear, will be small indeed. What I should like to know is, how long it will take to procure the original parent of either A or B, even providing those hybrids which more nearly represent either of the two parents are used. I have previously shown that I consider any hybrid capable of reproducing itself true from seed. Further experience shows us that if the hybrid is again crossed with one of the parents, we are able to procure practically intermediate characteristics between the two parents used. I might refer to the two new *Phaius*, *P.* 'Clive' (*simulans* × 'Norman'), and *P.* 'Harold' (*Sanderianus* × 'Norman'), both of which have been sufficiently distinct to receive recognition from the Orchid Committee. It will be noted that *P.* × 'Norman' is a hybrid between *P. simulans* × *Wallachii* var. *Sanderianus*). What we want to know is the 'truth' of the matter and to apply all the desirable facilities that we are able to procure to practical purposes. I will do my best to aid Mr. C. C. Hurst in his researches, and will do my utmost to supply what has been suggested during the flowering season."

Dangerous Compounds.—Mr. Holmes directed attention to a very dangerous preparation of arsenic offered for sale without proper safeguards under the name of "An Ant Destroyer." The bottle shown contained about three-quarters of an ounce of arsenic and fifteen fluid ounces of syrup, or enough to poison 150 adults. As it is recommended on the label that the preparation should be put on vine rods &c., it would probably prove either fatal to bees or poison their honey; since these insects eagerly steal sugar or a sugary solution wherever they find it; and, if placed on stones, to dogs, to say nothing of children, who, finding a sweet fluid in an ordinary bottle, might find it particularly attractive, the arsenic present being quite tasteless. The maker's name is not on the bottle. It must be a very profitable article to the manufacturers, as it costs less than 6*d.*, and sells for 3*s.* 6*d.* The word "poison" is *not* on a separate label, and might be easily overlooked. The Committee agreed with Mr. Holmes that such a dangerous preparation ought not to be freely obtainable by the public without proper restrictions, as provided by the Pharmacy Act of 1868, especially as other effective insecticides, not poisonous to animals, are obtainable without difficulty.

Scientific Committee, April 7, 1903.

Dr. M. T. Masters, F.R.S., in the Chair, and nine members present.

Scientific Investigations.—The reply from the Council to the resolution adopted on March 10 was as follows:—"Whilst the Council very greatly desire to see such a department created in connection with the Society's Gardens, they think it a matter which, under existing circumstances, had better be deferred for twelve months."

Primrose malformed.—Mr. A. W. Sutton, V.M.H., Woolhampton, sent a specimen in which the umbel was partly formed, but with multifold flowers of twelve parts, and with a partly petaloid calyx &c.

Narcissus with Double Corona.—Mr. Backhouse sent a variety which is said always to produce small trumpet-like appendages outside the orange corona—a malformation not previously observed.

Proposed Legislation for the Protection of Fruit Trees.—The Sub-Committee made the following suggestions:—(1) That the matter should be referred to the Fruit Committee as cultivators; (2) the Herefordshire County Council (with whom the movement initiated) had failed to make out a sufficient case for legislation; (3) forethought, vigilance, and good cultivation would be more effectual than an Act of Parliament; (4) there should be concerted action among growers in checking diseases &c., *e.g.* the Gooseberry-sawfly, which might be done if every cultivator in any district would dust or spray his bushes when attacked, and in the winter would remove a few inches of soil and burn or bury it deeply; (5) the Board of Agriculture has power to take immediate action in special cases; (6) self-interest on the part of the nurseryman would be more effective than occasional visits of an inspector; (7) the proposal to appoint a Government entomologist and mycologist is already to some extent acted upon by the Board of Agriculture: this should be more widely known; (8) it may be suggested that the Board of Agriculture might co-operate with the Society in establishing a permanent scientific research and experimental station to deal with plant diseases &c.

Peas attacked by Beetles.—Samples were received from Mr. Gregory, of Croydon, upon which Mr. Saunders reported:—"The Peas from India are attacked by *Bruchus pisi*, generally held to be introduced from abroad, but it is so common now that it is difficult to be quite certain on this point. Peas badly attacked should be destroyed at once, as they are of little or no use, and are only a source of infection."

Rose Shoot with Grub.—A shoot of a Rose was received through Mr. F. J. Baker, attacked by a borer, upon which Mr. Saunders reported: "The grub is that of the sawfly (*Pœcilosoma candidatum*). Many of these insects have more than one brood during the year. The infected shoot should be cut off and burnt, or the flies should be caught when flying about the bushes."

Manure with Grubs.—Samples were received from Dr. Parsons, Croydon. Mr. Saunders reported:—"The grubs are of a fly of the genus *Bibio*, to which the common St. Mark's fly (*B. Marci*) belongs. These grubs are very injurious when they attack the roots of plants. They are generally found in decaying vegetable matter or manure. They will soon turn to chrysalides, and the flies will appear in about a month. They can easily be caught in a net."

SCIENTIFIC COMMITTEE, APRIL 21, 1903.

Dr. M. T. MASTERS, F.R.S., in the Chair, and ten members present.

Aroids, coloured Foliage.—Sir Trevor Lawrence, V.M.H., and Mr. Odell exhibited examples of yellow-spathed Richardias with leaves half-yellow. As the upper half of the leaf was spotted, it was suggestive of a possible dissociation of hybrid characters. Sir Trevor also sent a

specimen of *Anthurium Scherzerianum* with a leaf half crimson and half green.

Narcissus with second Corona.—Flowers were sent to the last meeting by Mr. R. O. Backhouse, Sutton Court, near Hereford, upon which Dr. Masters reported: "The flowers show a series of outgrowths from the outer surface of the cup or corona. They resemble those of the 'frilled' Daffodils; but in this case the supplementary growths are at the base only, and are tubular or trumpet-shaped, the mouth of the trumpet being directed outwards. In some cases the outgrowths are so numerous and so regular that they constitute a second corona on the outside of the normal cup, thus resembling the 'cata-corolla' of some Gloxinias."

Crane-fly Grubs.—Grubs were sent by Mr. Millburn from Bath, also known as those of "daddy long-legs." Mr. Saunders observed that "they are sometimes known as 'leather-jackets,' from the toughness of the skin, which prevents insecticides from affecting them. A strong solution of common salt or nitrate of soda is distasteful to them, and helps the plants they are attacking. These grubs often come to the surface at night, and subsequently take shelter under turf, boards, &c. If slates and tiles be laid about, they should be turned over in the morning. Various birds—*e.g.* rooks, starlings, plovers, partridges, and pheasants—devour them. Towards the autumn, when the insects are about, rolling the grass will kill numbers of the flies."

Malta Botanic Garden.—Dr. Debono writes:—"The Argotti Gardens have been lately enriched with collections of Roses, Chrysanthemums, Carnations, Gladioli, Pelargoniums, and other florist's flowers. You will find in the lists of Pelargoniums one bearing my name, which was issued by Bruant, of Poitiers, and is the starting of a new race, the 'Cyclope.' In the way of adding evergreens to the exotic flora I have introduced from Australia, by seeds, many trees and shrubs. One, the *Myoporum serratum*, has proved a desideratum for Malta. Both Lord Grenfell and Lord Annesley were pleased with the double row of trees of it planted in the upper garden. It is a good wind-break, and but for it the cultivation of the plot would have been an impossibility. I have started an experimental farm station at Cape Balzan.

"No use for the *Oxalis cernua* has as yet been found; the *Ecballium*, however, is being cultivated to some extent with a view of preparing the drug. The prickly Comfrey and Caneigre are being experimented on. I have lately read that the *Portulacaria afra* is being turned to account as forage for cattle. It is claimed that of all South African plants it is the most resistent to dryness. I propose propagating it by the thousand to fill our open spaces with. Horticultural papers have lately spoken of the Ginseng, *Aralia* (*Panax*) *quinquefolia*: this I will try to introduce as an economic plant. I know its culture is rather difficult, and the Director of Kew Gardens published a leaflet to this effect; but I hope to succeed in the long run. There is ample field for work in Malta, and I hope something useful from an economic point of view may be hit upon at last."

Scientific Committee, May 5, 1903.

Dr. M. T. Masters, F.R.S., in the Chair, and eight members present.

Aconite and Caterpillars.—Mr. Holmes reported:—"The moth that attacks the Aconite flowers when in bud is *Plusia Moneta*, one of the *Noctuæ*. The grub appears about the middle of April, and its presence is recognised by the young leaves above the bud being fastened together, and later on by the black tips of the young leaves, where they have been eaten. A few years ago it first appeared in this country, feeding both on the Aconite and Delphinium, when high prices (from 5*s*. upwards) were paid for British specimens. Now it is so common around London that I found nearly a dozen in the Chelsea Physic Garden; and an acquaintance collected during a cycle ride in the neighbourhood of London last week as many as 500 larvæ, so that it is spreading rapidly. The furthest point north that I have seen it is Robin Hood's Bay, in Yorkshire. The single specimen seen there was attacked by ichneumons, which I gave, when hatched out, to the Zoological Department of the Natural History Museum, South Kensington. The eggs are laid on the fruit of the Aconite singly, here and there, and the young caterpillar apparently eats its egg-shell, as so many caterpillars do; but I was not able to trace them, and do not know what they feed on in the autumn, when the Aconite is withered, since the moths come out in June, and I have never found an autumn brood."

Fuchsia malformed.—Mr. Holmes sent a photograph of a blossom having two stamens, with filaments outside the base of the flower, observing: "It is difficult to understand the position of the stamens unless the leaves, which are alternate, are considered as the sepals of the flower the carpels of which may be developed into a second flower by a prolongation of the axis."

Tulostoma mammosum.—Mr. Holmes showed specimens of this little "stalked puffball," and observed:—"The stalk is usually hidden by the moss and herbage amongst which it grows. I found it at Braunton Burrows, North Devon, during Easter. It was growing scattered over a space of several yards on a rabbit-warren, and the rabbits' dung, being bleached, presented almost exactly the same appearance. Indeed, I should have passed the fungus by except that each seemed to have a dark spot in the centre (where the spores escape). One can hardly see the use to such a rare plant of protective mimicry; but the likeness was most remarkable in size, colour, and shape."

Acer van Volxemi frost bitten.—Dr. Masters showed sprays of this tree from the Caucasus severely cut by frost. The leaves were dead, but the shoot was uninjured. It was the first time that this species has been known to be frostbitten. The specimen was shown to illustrate the way in which the general appearance or habit of the shoots may be affected by frost. The shoots, though still alive, will be bare of leaves at the base all through the year. Japanese Maples were severely injured a few weeks ago near Bury St. Edmunds.

Scientific Committee, May 19, 1903.

Dr. M. T. Masters, F.R.S., in the Chair, and eleven members present.

Codlin Moth in California.—Mr. Fairhurst, Mitcham, described how the orchards in California, amongst the foothills near to Monterey, about seven miles from the sea coast, have of late years suffered much from the caterpillars of the codlin moth; and each year the plague is becoming worse, in spite of repeated sprayings from the blossoming time up to near the period of ripening. He adds that the bulk of last year's crop of Apples was so bad as to be almost unsaleable. Mr. Saunders reported:—"The codlin moth (*Carpocapsa pomonella*) makes its appearance about the end of May. The females lay their eggs on or close to the 'eye' of the Apples. Only one egg is laid on each fruit. The young caterpillar is hatched out in about a week or ten days, and at once eats its way into the Apple, working its way down the core to the pips, which it feeds on. In about three weeks or a month it is full-grown, and then gnaws its way to the surface of the fruit, and unless (which is frequently the case) the Apple has already fallen lets itself down by a silken thread to the ground; or, if the Apple is already on the ground, it merely crawls out. In either case it at once endeavours to make its way to the nearest tree, fence, or post, and, crawling up a short distance, finds some crack or other sheltered position, in which it hides and spins a silken web round itself, covered with a sticky substance. Within this shelter it remains during the winter, and early in the spring becomes a chrysalis, from which the moth emerges in May. It is obvious that when once the caterpillar is within the fruit nothing can be done to kill it without destroying the fruit; but if the tree is duly sprayed before this event takes place, and after the eggs are laid, the crop will to a great extent be saved. The proper time to spray is immediately the blossoms have fallen, and the best insecticides to use are either 1 lb. of Paris green, kept well mixed in 200 gallons of water, to which should be added an equal amount of lime to that of Paris green (bulk for bulk), to prevent any injury to the foliage; or a solution of paraffin emulsion may be used with almost equal success. When any Apples fall, they should be picked up at once; and any that are found to contain these caterpillars destroyed. All rubbish, stones, and other things under which the caterpillars could shelter should be removed, as they sometimes have to make shift with such. A number of the caterpillars may be caught by tying hay-bands round the stems of the trees, about 1 foot from the ground and another about 3 feet; or folded strips of old sacking, canvas, or some other similar material should be wired or tied round the trees, the object of this being to afford the caterpillars a convenient resting place in which to undergo their transformations. These traps should be examined every now and then, and any insects found in them destroyed. The bands should be put into position by the end of May. Before the buds in the spring show any signs of opening, it would be well to spray the trees with a caustic alkaline wash, composed of 1 lb. of caustic soda dissolved in half a bucket of water, then add $\frac{3}{4}$ lb. of pearlash; stir until dissolved, add enough water

to make the mixture up to 10 gallons, and then stir in 10 oz. of soft soap which has been dissolved in a little hot water."

Diseased Figs.—Dr. Cooke, V.M.H., reported:—"The Figs were covered about the apex of the fruit with a dense felted mass of a grey mould, which proved on examination to be a species of *Botrytis*, which does not appear to differ from *Botrytis cinerea*, already known for its destructive capacity. Originally known only as a saprophyte, it has proved parasitic and fatal to Lilies, and probably under different names to other cultivated plants. In the case of Figs we are not aware that it has been recognised before, and in the present instance no sclerotia have been found. With such a pronounced endophyte there is no hope that a remedy can be recommended."

Melon Disease.—With reference to a common Melon disease, Mr. Massee, V.M.H., observed that the spores of *Dendryphium comosum*, which appears to be the same as *Cercospora*, enter by the top lights when open, much more than from below. He had also found the fungus on the straw manure used, which communicated the spores to the leaves of the Melons or Cucumbers when covered by or touching the straw. A high temperature with deficient ventilation was very provocative of the disease.

Lemon, Dialysis.—Mr. Raphael sent a Lemon in which the carpels were more or less separated. A similar malformation in the Citron is known as "Buddha's fingers." It came from Mentone. He observed that such or similar malformations are far from uncommon.

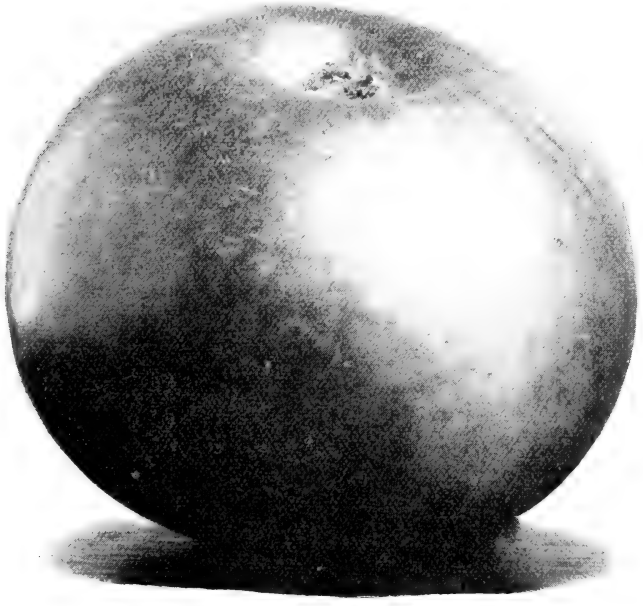


FIG. 43.—APPLE 'CORONATION.'

FRUIT AND VEGETABLE COMMITTEE.

JANUARY 13, 1903.

Mr. A. H. PEARSON in the Chair, and twenty members present.

Award Recommended :—

Silver Banksian Medal.

To W. Shuter, Esq., Belsize Grove, Hampstead (gr. Mr. T. Armstrong), for twenty-eight bunches of 'Black Alicante' Grapes.

Other Exhibits.

The Earl of Ilchester, Holland House, Kensington (gr. Mr. C. Dixon), sent 'Beurré Rance' Pears of excellent flavour grown on a standard tree.

Hon. C. Harbord, Gunton Park, Norwich (gr. Mr. W. Allan), sent large well-coloured fruits of Pear 'Bergamotte Esperen.'

Messrs. Sutton, Reading, staged large compact heads of Broccoli 'Superb Early White,' cut from the open ground.

Mr. W. Fyfe, Lockinge Gardens, Wantage, sent a new patent Tree-clip suitable for standard trees.

Messrs. W. Pink, 14 Commercial Road, Portsmouth, sent large Yams (*Dioscorea Batatas*) and Sweet Potato (*Ipomœa Batatas*). The latter is also known as the 'Barbados Potato.' (See vol. xxvii. p. 1089.) It was suggested that both vegetables be sent to the Vegetable Conference at Chiswick, September 29.

FRUIT AND VEGETABLE COMMITTEE, JANUARY 27, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and seventeen members present.

Awards Recommended :—

Silver Knightian Medal.

To Messrs. Rivers, Sawbridgeworth, for a collection of Oranges.

Cultural Commendation.

To Mr. G. Woodward, gr. to Roger Leigh, Esq., Barham Court, Maidstone, for large and delicious fruits of 'Passe Crassanne' Pears.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 10, 1903.

Mr. G. BUNYARD, V.M.H., in the Chair, and eighteen members present.

Awards Recommended :—

Hogg Memorial Medal.

To Messrs. Bunyard, Maidstone, for 100 dishes of Apples and Pears.

Silver Banksian Medal.

To J. B. Fortescue, Esq., Dropmore, Maidenhead (gr. Mr. C. Page), for thirty-six dishes of Apples.

Other Exhibit.

Messrs. Sutton, Reading, sent 'Sutton's Hardy Sprouting Kale,' a plant similar in growth to Brussels Sprouts, with a multitude of open sprouts all up the stem.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 24, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and seventeen members present.

Awards Recommended:—

Silver Banksian Medal.

To Mr. Will Tayler, Hampton, for twenty dishes of Apples.

Cultural Commendation.

To Mr. G. Wythes, V.M.H., Syon House Gardens, Brentford, for large well-blanched Asparagus forced on out-door beds.

Other Exhibit.

Miss C. E. Martin, Willowbrook, Auburn, N. Y., sent a most interesting collection of bottled fruits, pickles, &c. The whole exhibit was most beautifully preserved, but the bottled fruits, as Cherries, Plums, Strawberries, were far too sweet to please the British taste, and convinced the Committee of the truth of what they had often heard, viz. that our American cousins are addicted to a very sweet tooth indeed. The Peaches and Pears in Brandy were excellent, being not like our Brandy Cherries strong of spirit, but with only just a *soupçon* of the taste of Brandy, so that one could thoroughly enjoy a bottleful of the fruit. Some of the Pickles were very strange and novel, and it requires longer experience before expressing any opinion on them; but the Peach Chutnee and the sliced green Tomatos cannot be too highly recommended.

FRUIT AND VEGETABLE COMMITTEE, MARCH 10, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and nineteen members present.

Exhibit.

F. A. Bevan, Esq., Trent Park, New Barnet (gr. Mr. H. Parr), sent a hardy Borecole, somewhat like 'Read's Hearting.'

FRUIT AND VEGETABLE COMMITTEE, MARCH 24, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and twenty-two members present.

Award Recommended :—

Award of Merit.

To Apple 'Edward VII.' (votes, 11 for, 4 against), from Messrs. W. B. Rowe, Worcester. Fruit large, round, of good shape, skin yellow, covered with brown russety dots, eye full and open, stalk half-inch long, thin, and inserted in a small russety cavity; flesh firm, crisp, and pleasantly acid. The tree is said to be a sturdy grower and great bearer. Raised from 'Blenheim Orange' × 'Golden Noble.'

Other Exhibits.

Messrs. Cheal, Crawley, staged sixty dishes of Apples.

The Horticultural College, Swanley, sent 'Tom Thumb' and 'Paris White-seeded' Cabbage Lettuces, from seeds sown at the end of November and grown in a late vinery.

Lord Aldenham, Aldenham House, Elstree (gr. Mr. E. Beckett), sent very fine 'Royal Sovereign' Strawberries.

FRUIT AND VEGETABLE COMMITTEE, APRIL 21, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and eighteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Lady Hargreaves Brown, Broome Hall, Dorking (gr. Mr. B. Greaves), for very fine fruits of 'Royal Sovereign' Strawberries.

Cultural Commendation.

To Mr. J. Gibson, gr. to R. W. Hudson, Esq., J.P., for exceedingly fine 'Edwin Beckett' Peas, grown in a cool house.

To Messrs. Sutton, Reading, for three dishes of Peas.

Other Exhibits.

Lady Warwick Hostel, Reading, sent baskets of Strawberries.

Messrs. Day & Thelland, St. Helier, brought two large packing-cases for fruit. The Committee requested that one be sent to the Fruit Show at Chiswick, September 29, packed with fruit, with particulars as to the cost of the package.

Mr. Crook, Forde Abbey, Chard, sent Onion 'Crook's Long-keeper.'

Mr. G. Wythes, V.M.H., Syon House, Brentford, sent Cabbage 'Wythes' Early Gem,' raised from 'Ellam's Early' × 'Sutton's Marrow,' and said to be from fourteen to twenty days earlier than 'Ellam's Early.'

Mr. A. Dean proposed, and Mr. G. Wythes, V.M.H., seconded, the following resolution, which was carried unanimously, viz.—

"This Committee has learned with deep regret of the death of Mr. A. F. Barron, V.M.H., who was for many years its Secretary, and later

a member of the Committee, whose exceedingly wide knowledge in relation to fruits and vegetables, gathered during long service in the Society's Gardens at Chiswick, not only made him a high authority on these subjects, but also rendered his association with this Committee of inestimable value and service. This Committee respectfully desires that an expression of its cordial sympathy with Mrs. Barron and family in the loss they have sustained may be conveyed to them."

FRUIT AND VEGETABLE COMMITTEE, MAY 5, 1903.

Mr. J. CHEAL in the Chair, and eighteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Earl Stanhope, Chevening Park, Sevenoaks (gr. Mr. C. Sutton), for large and exceedingly well-kept 'Lady Downes' Grapes.

To Messrs. Cannell, Swanley, for a collection of vegetables.

To James Epps, Esq., Jun., Beulah Hill, Upper Norwood, for large fruits of *Theobroma Cacao* (the Cocoa plant or Chocolate-nut tree). Mr. Epps wrote: "These pods were grown at Norfolk House, Beulah Hill, on trees planted in a prepared border of a stovehouse. The trees are now eight years old, and during the summer months were laden with flowers. The flowers although bisexual have to be artificially fertilised owing to the want of proper insect agency. These pods were on the trees about seven months: two were cut last week, and one this morning. Pruning is absolutely necessary, and should be done in December. At the same time a good dressing of manure is beneficial. One tree this year bore nine pods, a second tree six, but they ripened prematurely when about two inches in length. The temperature of the house should never fall below 70°, with a humid air." (Fig. 44.)

Cultural Commendation.

To Messrs. Sutton, Reading, for remarkably fine 'Early Giant' Peas.

Other Exhibit.

J. G. Bulteel, Esq., Sefton Park, Stoke Poges, sent a box of 'Royal Sovereign' Strawberries.

FRUIT AND VEGETABLE COMMITTEE, MAY 19, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and twenty members present.

Awards Recommended :—

Hogg Medal.

To Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. J. Hudson, V.M.H.), for a very fine collection of fruit.

Silver Knightian Medal.

To J. Hodges, Esq., Rusper (gr. Mr. T. Le Pelley), for large and well-coloured 'Black Hamburgh' Grapes.

Other Exhibits.

From the Society's Gardens came a collection of Radishes.

The Duke of Sutherland, Trentham (gr. Mr. P. Blair), sent a seedling Apple.

Fig. 44. Theobroma Cacao growing at Mr. Epps'.

The Efficient Lighting and Heating Co., Portman Square, staged 'Stubbs' Patent Fuel Economiser,' which the Committee wished to be tested at the Society's Gardens.

FLORAL COMMITTEE.

JANUARY 13, 1903.

Mr. W. MARSHALL in the Chair, and twenty-eight members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Jas. Veitch, Chelsea, for *Coleus thyrsoideus* and winter-flowering Begonias.

Silver Flora Medal.

To Messrs. Cannell, Swanley, for Primulas and *Coleus thyrsoideus*.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations and flowering plants.

Bronze Banksian Medal.

To Mr. Russell, Kew Road, Richmond, for Aucubas.

First-class Certificate.

To *Coleus thyrsoideus* (votes, unanimous), from Messrs. J. Veitch, Chelsea, and Messrs. Cannell, Swanley. A remarkably pretty free-growing winter-flowering greenhouse plant, introduced from British Central Africa, and flowered for the first time in this country in the Royal Gardens, Kew, about five years ago. Unlike the once popular ornamental-leaved *Coleus*, this species is conspicuous for its small but showy Salvia-like blue flowers, borne in terminal racemes, often 10 inches long. The leaves, set on long footstalks, are ovate, toothed, and pale green. (Fig. 45.)

Award of Merit.

To Decorative Chrysanthemum 'Miss Edith Davy' as a late-flowering variety (votes, unanimous), from Mr. M. Hutchings, Hillingdon, Uxbridge. A sport from 'Framfield Pink' (syn. 'Madame Felix Perrin'). The new variety is of excellent constitution, but a trifle dwarfer than its parent. The flowers are of a lovely shade of pale chocolate or red suffused with salmon.

To Decorative Chrysanthemum 'Harry Whateley' (votes, unanimous), from Mr. Whateley, Kenilworth. A beautiful late-flowering sport from the well-known variety 'niveus.' The flowers are pure white and the fimbriated petals are long and narrow.

To Decorative Chrysanthemum 'Ruby Martin' (votes 16 for, 5 against), from Mr. Martin, Leighton Buzzard. A sport from 'Matthew Hodgson.' Plant 3 feet 6 inches high; sturdy habit and very free-flowering; colour old gold and chestnut red. The petals are distinctly forked at the tips.

Other Exhibits.

Lady Wantage, Lockinge Park, Wantage (gr. Mr. W. Fyfe), sent flowering sprays of *Ipomœa rubro-cærulea*, an old-fashioned and pretty stove climber with blue Convolvulus-like flowers. It was introduced from South Mexico upwards of seventy years ago.

E. M. Mundy, Esq., J.P., Shipley Hall, Derby (gr. Mr. J. C. Tallack), sent a new winter-flowering Carnation named 'Mrs. Miller Mundy,' a

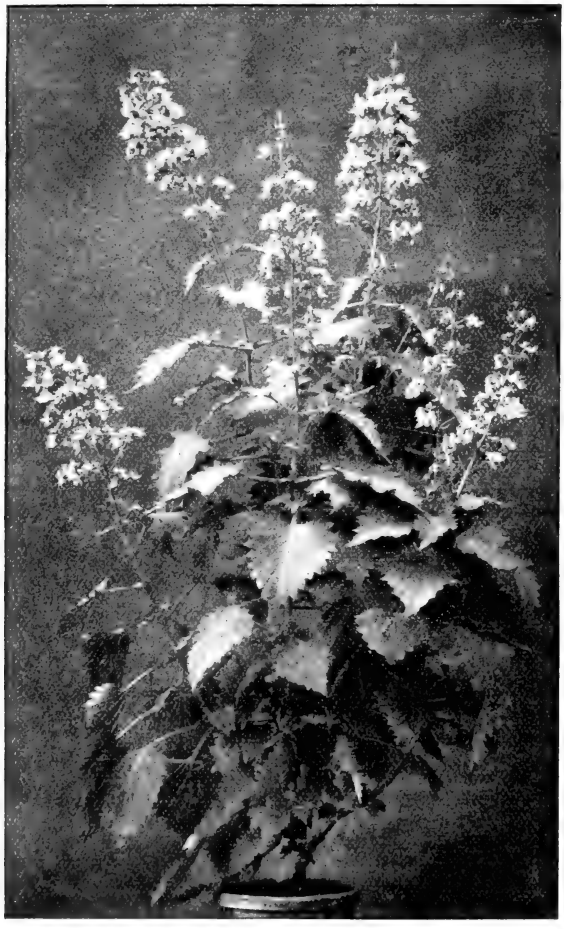


Fig. 45.—Coleus thyrsoideus.

promising sport from the popular 'Mdlle. Thérèse Franco.' The variety is of strong constitution, and the large shapely flowers in their early stages are bright scarlet, gradually changing with age to soft red, and are remarkable for their long-lasting powers.

Lady Richards, The Cottage, Fetcham, Surrey (gr. Mr. G. T. Poulter), sent Violets.

From Messrs. Barr, Covent Garden, came a small collection of Christmas Roses (*Helleborus niger*) and long sprays of *Jasminum nudi-*

florum, introduced to cultivation by one of the Society's travellers, Mr. Robert Fortune, in 1844, at which time it was considered tender and treated as a greenhouse plant, whereas now it is to be seen everywhere, withstanding our severest frosts and blooming outdoors in midwinter.

Messrs. Wells, Earlswood, sent flowers of Chrysanthemum 'Christmas Crimson' and 'C. C. W. Payne,' a sport from 'Princess Victoria.'

Mr. Shiach, Helensburgh, N.B., sent leaves of a silver variegated Laurel (*Cerasus Pseudo-cerasus*), an old but seldom-planted shrub.

FLORAL COMMITTEE, JANUARY 27, 1903.

Mr. W. Marshall in the Chair, and sixteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Cannell, Swanley, for Primulas.

Silver Banksian Medal.

To Messrs. Low, Enfield, for greenhouse flowering and foliage plants.

Bronze Flora Medal.

To Messrs. Barr, Covent Garden, for hardy flowers.

Award of Merit.

To *Kniphofia* (*Tritoma*) *longicollis* (votes, unanimous), from J. T. Bennett-Poë, Esq., V.M.H., Holmewood, Cheshunt (gr. Mr. Downes). A distinct and rather tender South African species, with rich canary-yellow flowers, borne on long spikes.

Other Exhibit.

Lord Rothschild, Tring (gr. Mr. E. Hill), sent Hippeastrums.

FLORAL COMMITTEE, FEBRUARY 10, 1903.

Mr. W. MARSHALL in the Chair, and twenty-three members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. John May, Twickenham, for Cyclamen.
To Messrs. Ware, Feltham, for Alpines and spring flowers.
To Messrs. Bull, Chelsea, for Palms.

Silver Flora Medal.

To Messrs. Jas. Veitch, Chelsea, for *Coleus thyrsoideus* and Primulas.
To Mr. H. B. May, Upper Edmonton, for foliage plants and Ferns.
To Mr. Russell, Richmond, for hardy shrubs.

Silver Banksian Medal.

To Messrs. Cannell, Swanley, for Primulas.

First-class Certificate.

To *Saxifraga Grisebachi* (votes, 10 for), from Mr. G. Reuthe, Hanworth Road, Feltham, and Messrs. Robt. Veitch, Exeter. It is of neat growth, reminding one of *S. media*, with rather short spathulate light green leaves arranged in dense rosettes and upright reddish-coloured

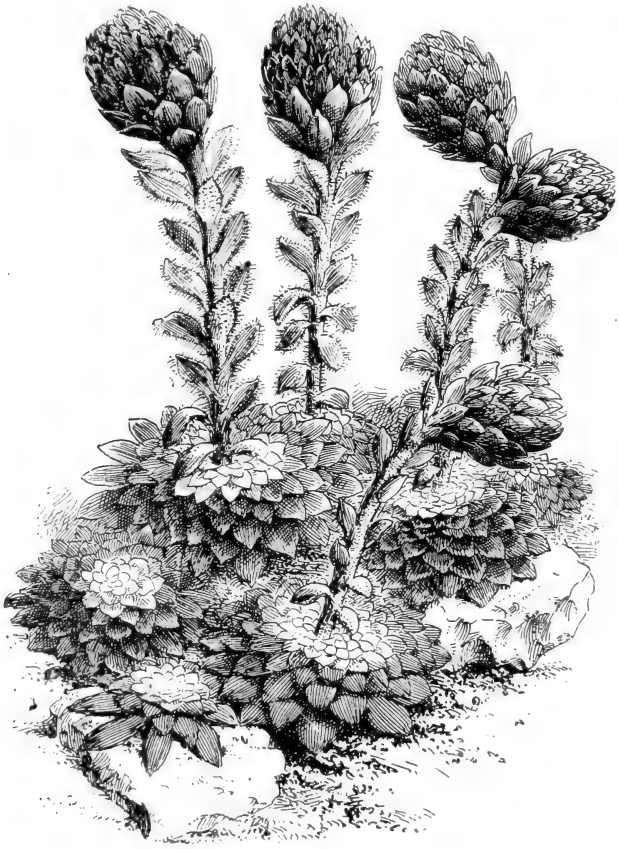


Fig. 46.—Saxifraga Grisebachi. (*Journal of Horticulture.*)

hirsute leafy spikes about 4 inches high. The small drooping purplish-red flowers appear in terminal clusters and remain in beauty for a long time. (Figs. 46 and 47.)

Botanical Certificate.

To *Lourya campanulata* (votes, unanimous), from Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.). An uncommon and interesting plant introduced from Cochin China about fourteen years ago. It has broad deep-green arching Aspidistra-like

leaves, and produces short stiff spikes of campanulate creamy-white flowers blotched with violet-purple in the centre. The small flowers are succeeded by attractive blue berries.

Other Exhibits.

The Earl of Jersey, Osterley Park, Isleworth (gr. Mr. J. Hawkes), sent Cyclamen and Begonias.

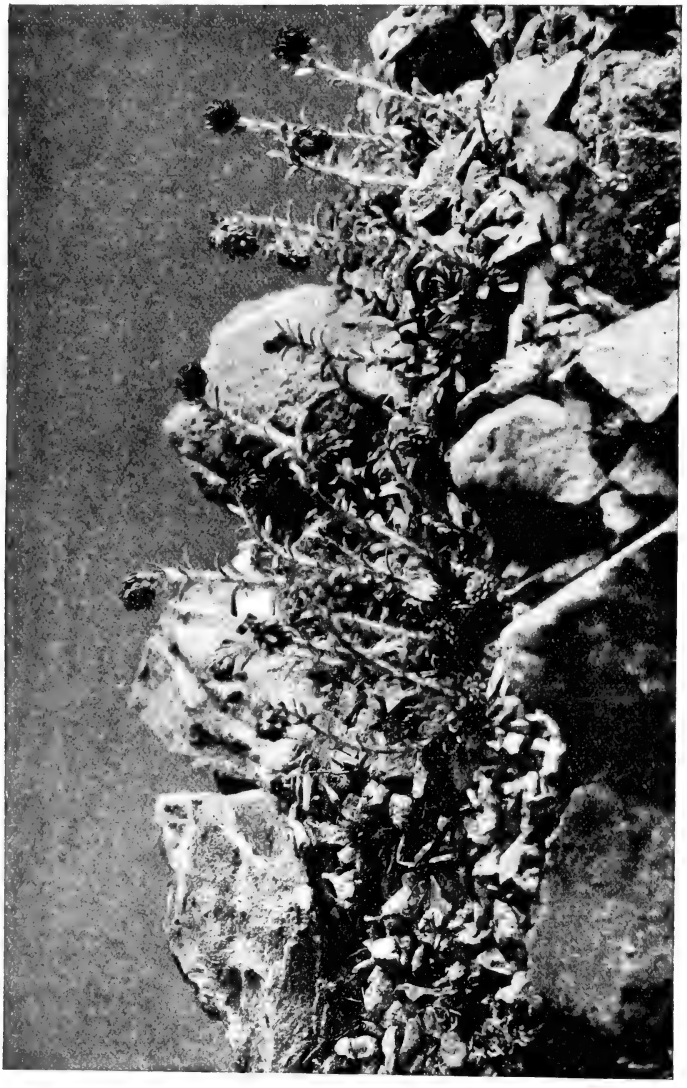


Fig. 47.—Saxifraga Griesbachii.

Major Hibbert, Ashby St. Ledgers, Rugby (gr. Mr. W. Camm), sent flowers of a promising new winter-flowering Carnation.

FLORAL COMMITTEE, FEBRUARY 24, 1903.

Mr. W. MARSHALL in the Chair, and twenty-seven members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Lord Aldenham, Aldenham House, Elstree (gr. Mr. E. Beckett), for *Thyrsacanthus rutilans* and Cyclamen.

To Messrs. Cuthbert, Southgate, for hardy forced Azaleas.

Silver-gilt Banksian Medal.

To Messrs. Jas. Veitch, Chelsea, for Clivias and *Loropetalum chinense.*

To Mr. Odell, Colham Green, Hillingdon, for Cyclamen and Primulas.

Silver Flora Medal.

To W. M. Cazalet, Esq., Fairlawn, Tonbridge (gr. Mr. F. Cubberley), for *Begonia* 'Gloire de Sceaux.'

To Messrs. Cannell, Swanley, for Cyclamen.

To Messrs. Barr, Covent Garden, for spring flowers.

To Mr. Russell, Richmond, for hardy flowering shrubs.

Silver Banksian Medal.

To Messrs. Ware, Feltham, for Narcissi and spring flowers.

To Mr. H. B. May, Edmonton, for greenhouse flowering plants.

To Messrs. Jackman, Woking, for hardy flowers.

To Mr. Mount, Canterbury, for Roses.

To Mr. Reuthe, Keston, Kent, for hardy flowers.

To Messrs. Wallace, Colchester, for bulbous plants.

Bronze Flora Medal.

To her Grace the Duchess of Bedford, Chenies, for Hellebores.

To Mr. Drost, Richmond, for forced Lilacs and *Azalea mollis.*

Award of Merit.

To *Iris* × 'perpurs' (votes, 25 for), from Miss Willmott, V.M.H., Great Warley. This new Iris raised by Mr. Van Tubergen between *I. persica* and *I. p. purpurea* grows about 4 inches high, is quite hardy, well adapted for the rockery, and remarkable for its handsome flowers, the colour of which reminds one of *I. reticulata Krelagei.* The falls are broad, deep velvety purple, striped with yellow down the centre, and the petaloid stigmas light purple touched with violet. The plant exhibited had been placed in a cold frame in order to facilitate its flowering.

Other Exhibits.

The Dowager Countess of Harrowby, High Ashurst, Dorking (gr. Mr. G. Bond), sent a beautifully flowered plant of *Ranunculus cortusæfolius,* an uncommon species with large rich yellow flowers. It was introduced from Teneriffe in 1826.

Mrs. Sophia Miller, 1 Campden Hill Road, Kensington, sent some excellent paintings of flowers.

Mrs. W. H. Burns, North Mymms Park, Hatfield (gr. Mr. C. R. Fielder), sent Violets.

From Mrs. Johnstone, Bignor Park, Pulborough, came a small group of *Thyrsacanthus rutilans*, an old-fashioned stove plant bearing an abundance of small, pendulous, Fuchsia-like, crimson flowers, in long racemes.

G. H. Hadfield, Esq., Moraston House, Ross, Hereford (gr. Mr. J. Rick), sent Violets.

Mrs. Disney Leith, Northcourt, Sharwell, I.W., sent Violets.

S. Kendall, Esq., Stanhope Gardens, Kensington, sent Daffodils.

Mr. Elliott, Hurstpierpoint, sent plants of *Asparagus scandens* to which an award of merit was given on January 14, 1902, under the name of *A. japonicus*.

FLORAL COMMITTEE, MARCH 10, 1903.

Mr. W. MARSHALL in the Chair, and twenty-four members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Hill, Lower Edmonton, for Ferns.

Silver Flora Medal.

To Mr. H. B. May, Upper Edmonton, for flowering plants.

To Mr. J. May, Twickenham, for Cyclamen.

Silver Banksian Medal.

To Messrs. Cuthbert, Southgate, for hardy Azaleas.

To Messrs. Ware, Feltham, for hardy flowers.

To Messrs. Cripps, Tunbridge Wells, for Japanese Maples and *Rondeletia cordata*.

To Mr. Prichard, Christchurch, for hardy flowers.

Bronze Flora Medal.

To Messrs. Jackman, Woking, for hardy flowers.

To Mr. Reuthe, Keston, Kent, for hardy flowers.

Bronze Banksian Medal.

To Lady Bathurst, Cirencester (gr. Mr. T. Arnold), for Clivias.

To F. A. Bevan, Esq., Trent Park, New Barnet (gr. Mr. H. Parr), for Hippeastrums.

First-class Certificate.

To *Magnolia Campbelli* (votes, unanimous), from W. E. Gumbleton, Esq., Belgrove, Queenstown, Cork, and Messrs. Robt. Veitch, Exeter. In Bhotan, on the Eastern Himalayas, where Dr. Griffith discovered this species at elevations of from 8,000 to 10,000 feet, it assumes quite the form and aspect of a forest tree with a straight trunk 80 feet high and at flowering time creates a wonderfully pretty effect. It was named by Sir Joseph Hooker and Dr. Thompson to commemorate the services of Dr. Campbell, of Darjeeling, a gentleman who had identified himself with the

botany and geography of the Himalayas. It is unfortunately a disappointing tree in the changeable climate of this country, because it only flowers in favoured places in the south and west of England and in parts of Ireland. Even under the best conditions it is a shy blossomer in a young state; consequently its value for outdoor garden embellishment is greatly reduced. Its huge, cup-shaped, slightly fragrant flowers, from 6 to 10 inches in diameter, composed of pale, rose-coloured petals internally, stained with rosy crimson externally, appear at the apex of the shoots in advance of the large rich green leaves.

To *Jasminum primulinum* (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. This is one of the best additions to hardy flowering shrubs made for many years. At first sight it appears to be a vigorous evergreen form of *J. nudiflorum*, with angular, deep green shoots, glossy trifoliate leaves, and handsome yellow blossoms, 2 inches across, of which a small percentage are semi-double. It produces a few flowers in autumn, but the most and best are borne in spring; and as the foliage is persistent the effect is greatly enhanced. It is a native of China, and has withstood 16 degrees of frost at Coombe Wood. (Figs. 48 and 49.)

Award of Merit.

To *Lachenalia* 'Ruth Lane' (votes, unanimous), from F. W. Moore, Esq., V.M.H., Glasnevin, Dublin. A pretty variety with large rich orange-coloured flowers, touched with green and tipped with reddish purple. The upper part of the flower spike and unopened buds are heavily shaded with orange-red.

Pinguicula caudata superba (votes, 17 for), from J. T. Bennett-Poë, Esq., V.H.M., Holmewood, Cheshunt (gr. Mr. Downes). This new Butterwort is perhaps best described as an improvement on the type, which is a dainty and rather uncommon dwarf stove plant. The flat flowers, borne on stems 7 inches high, are light purple or rosy-carmine, streaked with deep purple towards the white centre.

To *Clivia miniata* 'T. E. Arnold' (votes, unanimous), from Lady Bathurst, Cirencester House, Cirencester (gr. Mr. T. Arnold). A vigorous variety with an unusually large truss of shapely apricot-coloured flowers, the basal half of the segments light yellow.

Other Exhibits.

F. W. Moore, Esq., Glasnevin, sent seedling Lachenalias.

Mrs. Ernest Hills, Redleaf, Penshurst, sent some lovely flowers of *Camellia reticulata* introduced into this country about eighty years ago. Its semi-double, rosy-carmine flowers, with a central cluster of yellow stamens, are not only distinct but larger and superior to those of any other species, and indeed to any of the garden varieties of *Camellia japonica*. It is of upright habit with dull-green, reticulated leaves, and flourishes in cool glasshouses.

Dr. Bonavia, Richmond Road, Worthing, sent seedling Auriculas.

From Mr. Anker, George Street, W., came cactaceous plants.

Messrs. De Graaff, Leiden, Holland, sent *Richardia Childsiana*.

Mr. Kromer, Croydon, sent flowers of an unnamed *Aristolochia*.

FIG. 48—JASMINUM PRIMULINUM.
A single blossom.

FIG. 49—JASMINUM PRIMULINUM.

FLORAL COMMITTEE, MARCH 24, 1903.

Mr. W. MARSHALL in the Chair, and twenty-six members present.

Awards Recommended:—

Gold Medal.

To Mr. Mount, Canterbury, for Roses.

Silver-gilt Banksian Medal.

To Messrs. Cuthbert, Southgate, for forced shrubs.

FIG. 50.—ANEMONE (HEPATICA) TRILOBA ALBA PLENA. (*Journal of Horticulture.*)

Silver Flora Medal.

To E. A. Hambro, Esq., Hayes Place, Hayes, Kent (gr. Mr. W. Beale), for alpine plants.

To Col. Rogers, Franklands, Burgess Hill, for Cyclamen.

To Mrs. W. H. Burns, North Mymms Park, Hatfield (gr. Mr. C. R. Fielder), for Carnations.

To Mr. H. B. May, Upper Edmonton, for foliage and flowering plants.

To Messrs. Jas. Veitch, Chelsea, for Cinerarias, Rhododendrons, and *Jasminum primulinum.*

Silver Banksian Medal.

To O. O. Wrigley, Esq., Bridge Hall, Bury (gr. Mr. E. Rogers), for Clivias.

To Messrs. Cutbush, Highgate, for forced shrubs.

To Messrs. Wallace, Colchester, for hardy flowers.
To Messrs. Jackman, Woking, for hardy flowers.

First-class Certificate.

To *Anemone* (*Hepatica*) *triloba alba plena* (votes, unanimous), from Miss Willmott, V.M.H., Warley Place, Great Warley, Essex. A dainty

Fig. 51.—Incarvillea grandiflora. (*Journal of Horticulture.*)

hardy plant with small flat, perfectly double pure-white flowers, borne on stiff stems a few inches high. It had for many years been doubted whether a double white *Hepatica* still existed. (Fig. 50.)

To *Incarvillea grandiflora* (votes, unanimous), from Messrs. Jackman, Woking. A new and handsome species, said to grow about 15 inches high, with green pinnate leaves and tubular flowers, much larger than those of *I. Delavayi*, from which they also differ in being deeper in colour; rosy-purple, striped with white in the throat, the basal portion being yellow. It enjoys a much longer flowering period than *Delavayi*, and is likely to prove a valuable addition to rock-garden plants. (Fig. 51.)

Award of Merit.

To *Boronia megastigma aurea* (votes, unanimous), from Messrs. Balchin, Hassocks, Sussex. In all probability this will make a grand

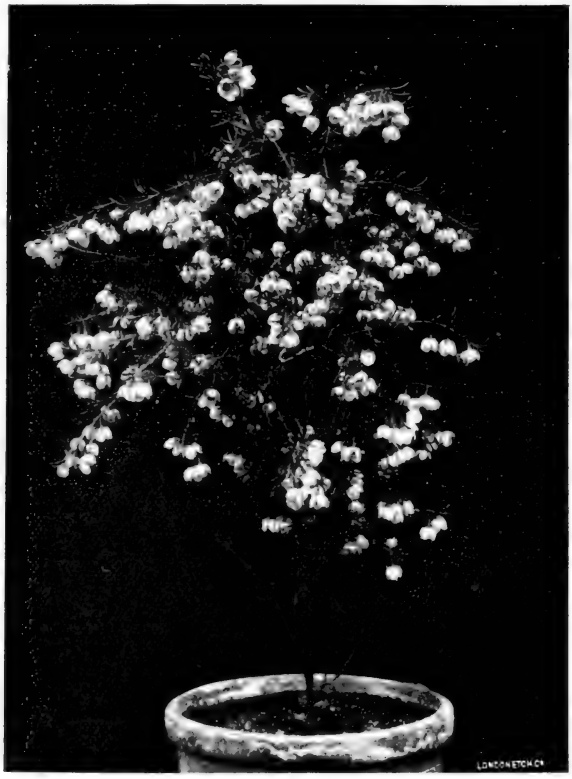


Fig. 52.—Boronia megastigma aurea.

show plant and a good companion to the type from which it sported about three years ago. Its pendent, creamy-yellow, sweet-scented flowers are borne in great profusion, and its habit is identical with that of its parent. (Fig. 52.)

Cultural Commendation.

To J. Collard Vickery, Esq., Leigh Holme, Streatham, for *Hippeastrum* (*Amaryllis*) 'Empress of India.'

Other Exhibits.

The Rt. Hon. Lord Rothschild, Tring Park, Tring (gr. Mr. E. Hill), sent a few large richly coloured seedling Hippeastrums.

Graham Vivian, Esq., Clyne Castle, Wales, sent flowers of *Rhododendron argenteum*, a beautiful Himalayan species.

Martin R. Smith, Esq., Warren House, Hayes, Kent (gr. Mr. C. Blick), sent shapely yellow flowers of a new Malmaison Carnation.

Frank Lloyd, Esq., Coombe House, Croydon (gr. Mr. M. E. Mills), sent a splendid strain of *Primula obconica*, with flowers almost double the size of the ordinary varieties.

A. R. Goodwin, Esq., The Elms, Kidderminster, sent some beautiful Anemones.

P. Purnell, Esq., Woodlands, Streatham Hill, sent a seedling *Primula*, probably a form of *P. Clusiana*.

Messrs. Sander, St. Albans, sent a group of *Retinospora Sanderi*.

Messrs. Cripps, Tunbridge Wells, sent Japanese Maples and *Rondeletia speciosa*, a free-growing stove evergreen with clusters of pale pink flowers.

FLORAL COMMITTEE, APRIL 7, 1903.

Mr. C. E. SHEA in the Chair, and twenty-six members present.

Awards Recommended :—

Gold Medal.

To Captain Holford, C.I.E., Westonbirt, Tetbury, Gloucester (gr. Mr. A. Chapman), for Hippeastrums.

Silver-gilt Flora Medal.

To Messrs. Frank Cant, Colchester, for Roses.

Silver-gilt Banksian Medal.

To Rt. Hon. Lord Rothschild, Tring Park, Tring (gr. Mr. E. Hill), for Moss Roses.

Silver Flora Medal.

To Messrs. Cutbush, Highgate, for forced shrubs and Carnations.

To Mr. Mount, Canterbury, for Roses.

Silver Banksian Medal.

To Sir F. T. Barry, Bart., M.P., St. Leonard's Hill, Windsor (gr. Mr. R. Brown), for Camellias grown out of doors.

To Messrs. Low, Enfield, for Palms and flowering plants.

To Messrs. John Waterer, Bagshot, for hardy shrubs.

To Messrs. Ware, Feltham, for Primulas and alpine plants.

To Mr. H. B. May, Upper Edmonton, for Roses and greenhouse plants.

To Messrs. Cuthbert, Southgate, for forced shrubs.

To Messrs. Watkins & Simpson, Covent Garden, for Wallflowers.

To Messrs. Cannell, Swanley, for Zonal Pelargoniums.

Bronze Flora Medal.

To Messrs. Carter, Holborn, for Cinerarias.
To Messrs. Wallace, Colchester, for hardy flowers.
To Mr. Upton, Millmead, Guildford, for alpine plants.

Bronze Banksian Medal.

To Mr. Box, West Wickham, Kent, for alpine plants.

Award of Merit.

To *Hippeastrum* 'Black Prince' (votes, unanimous), from Captain Holford, C.I.E., Westonbirt, Tetbury, Gloucester (gr. Mr. A. Chapman). A very large flower with dark crimson reflexing segments, deepening into maroon in the throat.

To *Hippeastrum* 'Fair Lady' (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. A medium-sized shapely delicate pink or apple-blossom-coloured flower, the upper segments rather deeper and streaked with crimson. This variety received an award under the name of 'Apple Blossom,' but it being discovered that an award had been given to a variety bearing the same name in 1889 the name was changed to 'Fair Lady.'

To *Caladium* 'Mossamedes' (votes, 12 for, 4 against), from Messrs. Bull, Chelsea. Unusually large cream-white leaves beautifully marked with green. The whole surface is suffused with pink, reminding one of 'Silver Cloud.'

To *Rosa polyantha* 'Madame Levavasseur' (votes, unanimous), from Mr. Turner, Slough. A dwarf and exceedingly floriferous form of the well-known 'Crimson Rambler' adapted for bedding or as an edging to Rose beds. Its semi-double flowers do not appear to be quite so deep in colour as those of 'Crimson Rambler.'

Other Exhibits.

Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Jas. Hudson, V.M.H.), sent a strong branch 6 feet long of *Prunus Pseudocerasus Watereri* laden with pale pink flowers.

A. P. Nix, Esq., Mount Challis, Truro, sent *Hippeastrum Islandriflorum.*

C. W. Parker, Esq., J.P., Faulkbourne Hall, Witham, Essex, sent *Anemone fulgens* and seedling Polyanthuses.

Colonel Baskerille, Crowsley Park, Henley-on-Thames, sent flowers of a new Violet.

From the Earl of Ilchester, Abbotsbury Castle, Dorset (gr. Mr. J. Benbow), came Rhododendrons and flowering shoots of *Edwardsia microphylla*, now recognised as *Sophora tetraptera microphylla*, an exceedingly beautiful but unfortunately rather tender shrub or small tree with racemes of rich yellow pendent flowers in spring. It is a native of New Zealand and was discovered by Sir Joseph Banks.

A. W. Sutton, Esq., Bucklebury Place, Berks, sent Primrose sports.

Messrs. Ladhams, Shirley, Southampton, sent *Trachelium flavum* 'Illuminator,' a pretty plant with golden-coloured leaves.

From Messrs. Jas. Veitch, Chelsea, came a very remarkable collection of dried specimens of new and rare Chinese trees and shrubs.

FLORAL COMMITTEE, APRIL 21, 1903.

Mr. GEORGE PAUL, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. Mount, Canterbury, for Roses.

Silver Flora Medal.

To Messrs. Jackman, Woking, for alpine plants.
To Messrs. Sutton, Reading, for Cinerarias.

Silver Banksian Medal.

To Messrs. Laing, Forest Hill, for *Streptocarpus*.
To Messrs. Ware, Feltham, for Primulas.
To Messrs. Cuthbert, Southgate, for forced shrubs.
To Messrs. Frank Cant, Colchester, for Roses.
To Messrs. Cutbush, Highgate, for forced shrubs.
To Messrs. Carter, High Holborn, for Cinerarias.
To the Guildford Hardy Plant Nursery, for alpine plants.

Bronze Banksian Medal.

To Mr. Perry, Winchmore Hill, for hardy plants.

First-class Certificate.

To *Pæonia lutea* (votes, 16 for), from Mr. Potten, Cranbrook, Kent. A distinct and beautiful Chinese tree Pæony with rather small Water-lily or cup-shaped fragrant flowers, with a prominent central cluster of deeper coloured stamens. The glaucous green foliage has conspicuous reddish-coloured midribs, veins, and footstalks. The plants had been flowered in a cold frame.

Award of Merit.

To *Lathyrus pubescens* (votes, 16 for), from Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain). A wonderfully pretty and uncommon perennial species from Chili, suitable for cool-house culture. Its pale-blue sweet-scented flowers are very enduring in a cut state.

To *Rehmannia angulata* (votes, unaminous), from Messrs. Jas. Veitch, Chelsea. A greenhouse perennial of upright growth, recently introduced from Central China, with conspicuous deep purple tube-shaped Incarvillea-like flowers, borne on stiff wiry stalks in the axils of the deep green much cut leaves. The interior of the throat is spotted with crimson on a white ground. (Figs. 53 and 54.)

To *Iris spuria fol. var.* (votes, 15 for, 2 against), from Messrs. Barr, Covent Garden. An upright growing *Iris* with yellow leaves 2–3 feet long passing to pale greenish-yellow with age. It is an attractive plant for the banks of streams and ponds.

To *Asperula suberosa* (votes, 16 for, 3 against), from Messrs. Ware, Feltham. A charming little rock-garden plant from Dalmatia with

small slender greyish-green hairy leaves arranged in whorls on hairy shoots a few inches long, which are inclined to droop over the sides of the pot. The small long tube-shaped pale pink flowers are borne in great profusion towards the apex of the growths. A dry sunny place on the rockery should be chosen in preference to one that is continually damp and shady.

To *Rhododendron* 'Duchess of Portland' (votes, 12 for), from Messrs. Fisher, Son, and Sibray, Handsworth, Sheffield. A hardy early free-flowering variety raised between *R. barbatum* and 'Handsworth Early

FIG. 53.—REHMANNIA ANGULATA. (*Journal of Horticulture.*)

White.' It is of sturdy growth and bears great trusses of pure-white flowers. (Fig. 55.)

Botanical Certificate.

To *Tanakea radicans* (votes, 13 for, 2 against), from R. H. Beamish, Esq., Ashbourne, Glaunthaune, Co. Cork, Ireland (gr. Mr. H. Hume). A small rock-garden plant with rather thick shining green serrated leaves on long footstalks and small white flowers borne on wiry upright branching spikes 8 inches high.

Other Exhibits.

Mrs. Faulkiner, Killucan Rectory, Co. Westmeath, Ireland, sent St. Brigid Anemones.

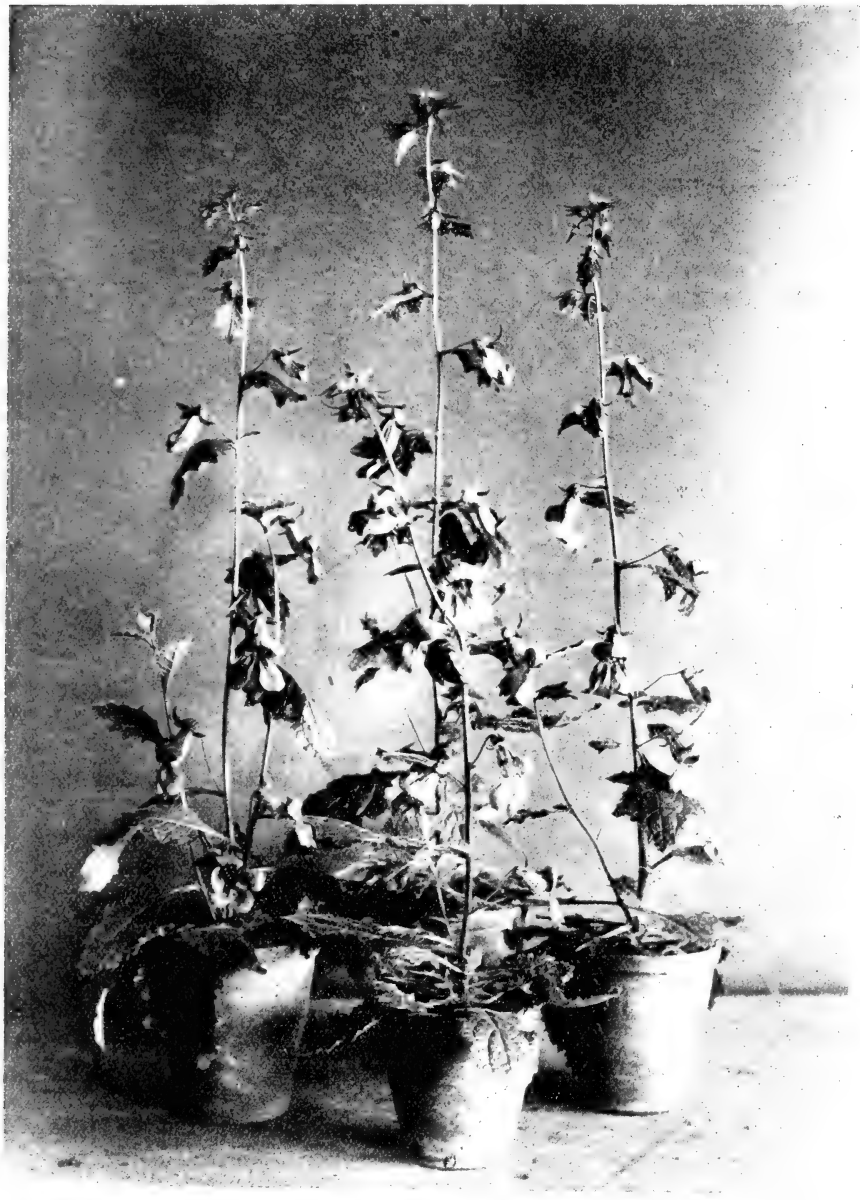


Fig. 54.—Rehmannia angulata.
(New Species from Hupeh, Central China.)

Hugh Andrews, Esq., Toddington Park, Winchcombe, Gloucester (gr. Mr. F. Capp), sent unnamed Carnations.

From F. W. Moore, Esq., V.M.H., Glasnevin, Dublin, came a large flowering branch of *Clianthus puniceus albus*, a remarkably free-flowering form of the well-known greenhouse climber. The flowers of the new variety are borne in dense racemes, and are of a greenish-white shade, particularly so in a young state.

R. Fox, Esq., Grove Hill, Falmouth, sent flowering sprays of *Pittosporum eugenioides* and *P. tenuifolium*, both tender species near London, but well suited—especially the first named—for cool-house culture.

Fig. 55.—Rhododendron 'Duchess of Portland.' (*The Garden.*)

Also *Rhododendron* 'Glory of Penjerrick,' a hybrid between *R. Aucklandii* and *R. Thomsonii*, with lovely stout rosy-red flowers in compact trusses; but as it was much damaged in transit the Committee asked to see it again next year.

From Messrs. Jas. Veitch, Chelsea, came a new *Boronia* from Central China with pink flowers.

Messrs. Frank Cant, Colchester, sent flowers of new H.P. Rose named 'Muriel,' similar to 'Suzanne Marie Rodocanachi.' The Committee asked to see it from the open ground.

Messrs. Cripps, Tunbridge Wells, sent plants of *Acer palmatum linearilobum purpureum gracile Crippsii*. Notwithstanding its terrible name, the Committee asked to see this also from the open ground.

Messrs. Paul, Cheshunt, sent beautiful flowers of *Rhododendron* 'Lady Alice Fitzwilliam,' new Roses, and a tree Carnation named 'Gaiety.' The Committee asked to see a plant of the last named.

Mr. Gauntlett, Redruth, sent *Rhododendron Gauntlettii*, a splendid hybrid between *R. Aucklandii* and *R. arboreum* with bold trusses of pink flowers, reminding one of 'Pink Pearl.'

Mr. Potten, Cranbrook, Kent, sent two beautifully flowered plants of climbing Rose 'Dorothy Perkins.'

FLORAL COMMITTEE, MAY 5, 1903.

Mr. GEO. PAUL, V.M.H., in the Chair, and nineteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. Mount, Canterbury, for Roses.

Silver Flora Medal.

To Messrs. Ware, Feltham, for hardy plants.
To Messrs. B. R. Cant, Colchester, for Roses.
To Messrs. Cannell, Swanley, for Zonal Pelargoniums.

Silver Banksian Medal.

To W. D. James, Esq., West Dean Park, Chichester (gr. Mr. W. H. Smith), for *Schizanthus wisetonensis*.

To N. L. Cohen, Esq., Bound Oak, Englefield Green, Surrey (gr. Mr. A. Sturt), for *Richardia Elliottiana*.

To Messrs. Low, Enfield, for *Schizanthus wisetonensis*.
To Mr. Perry, Winchmore Hill, for hardy flowers.
To Messrs. Cuthbert, Southgate, for Rhododendrons.
To Mr. H. B. May, Upper Edmonton, for Zonal Pelargoniums.
To Messrs. Jackman, Woking, for alpine plants.
To Messrs. Balchin, Hassocks, for Ericas, Boronias, and Leschenaultias.
To the Guildford Hardy Plant Nursery, for alpine plants.
To Messrs. Gilbert, Dyke, Bourne, Lincs., for Anemones.
To Messrs. Jas. Veitch, Chelsea, for *Schizanthus wisetonensis*.

Bronze Flora Medal.

To Messrs. Cutbush, Highgate, for greenhouse flowering plants.

Bronze Banksian Medal.

To Messrs. Cheal, Crawley, for hardy shrubs and alpine plants.
To Mr. Reuthe, Fox Hill, Keston, Kent, for hardy plants.

First-class Certificate.

To *Kalanchoë felthamensis* (*K. flammea* ♀ × *K. Kirkii* ♂) (votes, 13 for, 4 against), from Messrs. Jas. Veitch, Chelsea. A beautiful hybrid,

about 2½ feet high and best described as an improvement on its parents. The flowers are borne in large branching corymbs of a brighter orange-scarlet than those of *K. flammea*, while the fleshy leaves resemble those

Fig. 56.—Kalanchoë × felthamensis. (K. flammea × K. Kirkii.)

of the other parent, as they are lobed, serrated, and bronzy-green flushed with purple. A useful plant for indoor decoration and apparently of easy culture. (Fig. 56.)

Award of Merit.

To *Psoralea pinnata* (votes, unanimous), from J. G. Bulteel, Esq., Sefton Park, Stoke Poges, Bucks. An old-fashioned but rarely met-with greenhouse leguminous shrub introduced from Australia in 1690. It has long deep green pinnate leaves composed of slender leaflets $1\frac{1}{2}$–2 inches long and bears mauve or blue Pea-shaped slightly fragrant flowers with white wings. The flowers are borne in clusters at the points of the principal and side growths with much freedom.

To *Canna* 'Papa Crozy' (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. Bain). An unusually large truss of broad-petalled handsome orange-scarlet flowers marked and slightly edged with crimson. The leaves are bronzy-purple and very broad.

To Tea Rose 'Rambler' (Tea variety × 'Crimson Rambler') (votes, 13 for, 2 against), from Messrs. Paul, Cheshunt. A vigorous climbing variety with Tea-like shining green leaves and clusters of medium-sized soft salmon-pink slightly fragrant flowers.

To *Acer palmatum linearilobum purpureum gracile Crippsii* (votes, unanimous), from Messrs Cripps, Tunbridge Wells. A very elegant perfectly hardy Japanese Maple, with slender deep crimson leaflets, but with a sad burden for a name.

To *Anemone coronaria* 'King of Scarlets' (votes, unanimous), from Messrs. Gilbert, Dyke, Bourne, Lincs. A splendid early-flowering Anemone with large perfectly double bright scarlet flowers, $2\frac{1}{2}$ inches across, borne on stout stems well above the beautifully cut leaves.

Botanical Certificate.

To *Gesneria Douglasii* (votes, unanimous), from Mr. Kromer, Bandon Hill, Croydon. An uncommon stove species with rough deep green cordate serrated flat leaves arranged in whorls of sixes, and great quantities of long tubular rosy-purple and cream-coloured pendent flowers borne on stiff upright stems, also in whorls.

Other Exhibits.

Sir Trevor Lawrence, Bart., Burford, Dorking (gr. Mr. W. Bain), sent some excellent flowers of *Lapageria rosea* 'The Knoll variety' and a large plant of *Asparagus Sieberianus*.

F. G. Lloyd, Esq., J.P., Langley House, Langley, Bucks, sent *Rubus reflexus*, a glasshouse climbing species with pretty foliage. The Committee asked to see it again with particulars of origin.

Miss Willmott, V.M.H., Warley Place, Great Warley, sent plants of a strong growing exquisitely deep blue 'Forget-me-not' named 'Warley.'

From Mrs. Martin, Brunswick Terrace, Plymouth, came flowers of an unnamed Rose. It was considered to be 'Madame Lambard.'

Dr. Bonavia, Richmond Road, Worthing, sent flowers of *Solanum jasminoides*, *Nerium odorum fl. pl.*, and *Pelargonium Clorinda*. The Committee asked to see a plant of the last named.

Martin R. Smith, Esq., Hayes, Kent (gr. Mr. C. Blick), sent Malmaison Carnations.

W. D. James, Esq., West Dean Park, Chichester (gr. Mr. W. H. Smith), sent a new border Carnation with large shapely flowers.

C. J. Richardson, Esq., Beech Hill, Englefield Green, Surrey, sent flowers of *Strelitzia Reginæ*, a well-known warm greenhouse plant with orange-yellow and purple flowers.

FLORAL COMMITTEE, MAY 19, 1903.

Mr. C. E. SHEA in the Chair, and seventeen members present.

Awards Recommended:—

Silver Flora Medal.

To Mr. Prichard, Christchurch, Hants, for hardy flowers.
To Messrs. Jackman, Woking, Surrey, for alpine plants.
To Messrs. Cannell, Swanley, for Regal Pelargoniums.
To Messrs. Jas. Veitch, Chelsea, for Cape Pelargoniums.
To Messrs. Blackmore and Langdon, Twerton, Bath, for Begonias, amongst which was the beautiful 'Edith Andrews.' (Fig. 57.)
To Messrs. Frank Cant, Colchester, for new Roses.
To Messrs. B. R. Cant, Colchester, for Roses.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for hardy shrubs.
To Messrs. Cutbush, Highate, for Malmaison Carnations.
To Messrs. Ware, Feltham, Middlesex, for Roses.

Bronze Banksian Medal.

To Mr. H. B. May, Upper Edmonton, for foliage Begonias.
To Messrs. Peed, West Norwood, for Gloxinias.
To Messrs. Paul, Cheshunt, for Lilacs.

Award of Merit.

To *Rhododendron yunnanense* (votes, 9 for, 4 against), from F. W. Moore, Esq., V.M.H., Glasnevin, Dublin. A perfectly hardy species introduced from the Chinese province of Yunnan by the Abbé Delavay. It is of upright slender habit with small deep green lanceolate leaves and large trusses of Azalea-like delicate pink flowers with brown spots on the upper segments.

To *Rubus moluccanus* (votes, unanimous), from F. G. Lloyd, Esq., J.P., Langley House, Langley, Bucks, and Messrs. Jas. Veitch, Chelsea. An old but very uncommon greenhouse climbing species, introduced from the Malay Archipelago. Its palmately lobed leaves, from 6 to 8 inches long, are deep bronzy-green in the centre with a broad irregular margin of pale green. It is also known under the name of *R. reflexus*, and in general appearance reminds one of a fine-foliaged *Begonia*.

To Tea Rose 'Souvenir de Pierre Notting' (votes, unanimous), from Mr. Prince, Longworth, Berks. A delightful variety raised by MM. Soupert et Notting between 'Maréchal Niel' and 'Maman Cochet.' The growth and foliage are similar to those of the last named, whilst the apricot-coloured deliciously scented shapely flowers bear some resemblance to those of 'Maréchal Niel.'

FIG. 57.—BEGONIA 'EDITH ANDREWS.'

(*To face page* lxvi.)

To *Hippeastrum* 'Julius' (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. Medium-sized bright scarlet shapely flowers, distinctly edged with white.

To *Aubrietia* 'A 1' (votes, unanimous), from Mr. Prichard, Christchurch, Hants. A splendid variety of free-spreading habit with an abundance of large deep purple flowers shading to violet.

To Border Carnation 'Alma' (votes, unanimous), from Messrs. Blackmore, Langdon, Twerton, and Bath. Unusually large broad-petalled deepcrimson or maroon clove-scented flowers.

Other Exhibits.

Dr. Bonavia, Richmond Road, Worthing, sent *Pelargonium Clorinda.*

F. W. Moore, Esq., V.M.H., Glasnevin, Dublin, sent *Heliconia brasiliensis*, a little known stove species, with small cream-coloured flowers enclosed in large thick bright red bracts.

Mr. H. B. May, Upper Edmonton, sent *Nephrolepis Piersoni.* The Committee asked to see this again.

From Messrs. Bull, Chelsea, came flowers of Stock 'White Excelsior,' a sport from 'Giant Emperor,' with spikes, about 2 feet long, bearing perfectly double pure-white flowers nearly as big as a five-shilling piece.

ORCHID COMMITTEE.

JANUARY 13, 1903.

Mr. HENRY LITTLE in the Chair, and eighteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Captain G. L. Holford, C.I.E., Westonbirt, Tetbury (gr. Mr. Alexander), for an elegantly arranged group of Orchids.

FIG. 58.—ODONTOGLOSSUM × WALTONIENSE. (*Journal of Horticulture.*)

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. W. P. Bound), for an effective arrangement of Orchids, and *Asparagus Sprengeri.*

To Messrs. Jas. Veitch, Chelsea, for a collection of hybrid Orchids.

First-class Certificate.

To *Odontoglossum* × *waltoniense* (*crispum* ♀ *polyxanthum* ♂) (votes, unanimous), from W. Thompson, Esq., Walton Grange (gr. Mr. W. Stevens). Flower resembling a good, bright, canary-yellow form of *O. crispum*, the only evidence of the brown blotches of *O. polyxanthum* being a large irregular chestnut-brown blotch on each labellum, and a single brown spot on a sepal of one of the flowers. (Fig. 58.)

To *Cypripedium* × *Hindeanum* (*Godefroyæ* × *insigne* 'Harefield Hall variety') (votes, unanimous), from Messrs. Sander, St. Albans. A

noble flower of fine substance and form, yellowish-cream colour, the upper sepal being veined and blotched with purple, the petals and lip tinged with rose-purple.

Fig. 59.—Cypripedium × 'Minnie.'

Award of Merit.

To *Cypripedium* × 'Minnie' (parentage unrecorded) (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Gilbert). A very perfectly formed flower. Upper sepal round and flat,

white with purple spotting; petals and lip honey-yellow tinged with purple-brown. (Fig. 59.)

To *Cypripedium* × 'Empress Alexandra' (*Godefroyæ* × *nitens*) (votes, unanimous), from Messrs. Sander. Upper sepal greenish at base, white on the upper half, with dark purple markings in the centre; petals and lip tinged with purple.

To *Odontoglossum Lucasianum*, Hort. var. *Walkeri* (supposed nat. hyb.) (votes, 15 for, 2 against), from Messrs. Hugh Low, Bush Hill Park. A plant imported with *O. Hallii*, which it closely resembles. Flowers brownish, tipped and margined with yellow; lip whitish with brown spots.

Other Exhibits.

J. Gurney Fowler, Esq. (gr. Mr. Davis), showed *Cypripedium* × 'Leander' *reticulatum*.

De B. Crawshay, Esq. (gr. Mr. Stables), sent *Lælia anceps* 'Theodora,' white tinged with lavender.

J. Wilson Potter, Esq. (gr. Mr. J. W. Young), showed *Cypripedium* × 'J. Wilson Potter' (parentage unrecorded), a fine flower of a dark rose-purple tint.

Major Joicey (gr. Mr. F. J. Thorne) sent *Dendrobium spectabile*, *D. Johnsoniæ*, &c.

J. T. Bennett-Poë, Esq. (gr. Mr. Downes), sent *Dendrobium spectabile*.

W. Thompson, Esq. (gr. Mr. Stevens), sent *Cypripedium* × *Thompsonii*.

Baron Sir H. Schröder (gr. Mr. H. Ballantine showed *Cypripedium* × *Leeanum Clinkaberryanum*.

H. E. Gordon, Esq., Glasgow (gr. Mr. Boucher), showed two hybrid Cypripediums.

Messrs. Charlesworth sent *Cypripedium aureum* &c.

M. A. A. Peeters, Brussels, showed five forms of *Cypripedium* × *aureum*; also *C.* × *Lathamianum splendens*.

M. Otto Beyrodt, Berlin, sent forms of *Cattleya Trianæi*, and Odontoglossums.

Francis Wellesley, Esq. (gr. Mr. Gilbert), sent *Cypripedium* × *Memoria Jernninghamæ* and *Lælio-Cattleya* × 'Helena var. Miss Laura Webb.'

ORCHID COMMITTEE, JANUARY 27, 1903.

Mr. HARRY J. VEITCH in the Chair, and fifteen members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. Sander, St. Albans, for a group of Orchids.

First-class Certificate.

To *Odontoglossum* × *Bradshawiæ* (*Harryanum* × *Andersonianum*) (votes, unanimous), from J. Bradshaw, Esq., The Grange, Southgate (gr. Mr. Whiteleggo). A showy hybrid, in general appearance resembling

O. × *Harryano-crispum*, but with the colours arranged as in *O.* × *Andersonianum*. Sepals and petals pale yellow, marked on the inner halves with dark purple, the petals having a white base. Lip white with purple spots on the lower half, crest yellow. (Fig. 60.)

To *Zygopetalum* × *Sanderi* (*Perrenoudii* × *Mackaii* (votes, unanimous), from Messrs. Sander. An improvement on *Z.* × *Perrenoudii*. Sepals and petals pale green, barred with purple; lip whitish at the base and with raised lines of violet colour, merging into the showy purplish-rose front portion.

Award of Merit.

To *Cypripedium* × 'J. Wilson Potter' (parentage unrecorded) (votes, unanimous), from J. Wilson Potter, Esq., Elmwood, Croydon. *C. Har-*

Fig. 60.—Odontoglossum × Bradshawiæ. (*Journal of Horticulture.*)

risianum superbum × *Charlesworthii* was suggested as the parentage, but the flower does not agree with *C.* × *bingleyense* of similar record. Flower round and finely formed; purplish-rose, darker on the veining, and with clear white margin to the upper sepal. (Fig. 61.)

Cultural Commendation.

To Mr. E. Hill (gr. to the Right Hon. Lord Rothschild), for *Phalænopsis Schilleriana* with eighty-eight and *P. Stuartiana* with thirty-eight flowers to a spike.

To Mr. Downes (gr. to J. T. Bennett-Poë, Esq.), for a fine specimen of *Ipsea speciosa*.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Gilbert), showed three hybrid Cypripediums.

J. Colman, Esq., Gatton Park (gr. Mr. W. P. Bound), sent varieties of *Dendrobium* × *Wiganianum*.

Fig. 61.—Cypripedium × 'J. Wilson Potter.' (*Journal of Horticulture.*)

J. Bradshaw, Esq., sent good varieties of *Lycaste Skinnerii*.

Norman C. Cookson, Esq. (gr. Mr. H. J. Chapman), sent the heavily blotched *Odontoglossum* × *loochristyense* 'Oakwood variety.'

Orchid Committee, February 10, 1903.

Mr. Harry J. Veitch in the Chair, and twenty-three members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Sander, St. Albans, for a group of rare Orchids.

Silver Flora Medal.

To Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White), for a group of hybrid Dendrobiums, and other Orchids, profusely flowered.

To Captain G. L. Holford, Westonbirt (gr. Mr. Alexander), for a group of Odontoglossums &c.

To H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), for a group of Orchids.

To J. Colman, Esq., Gatton Park (gr. Mr. W. P. Bound), for a group of Orchids.

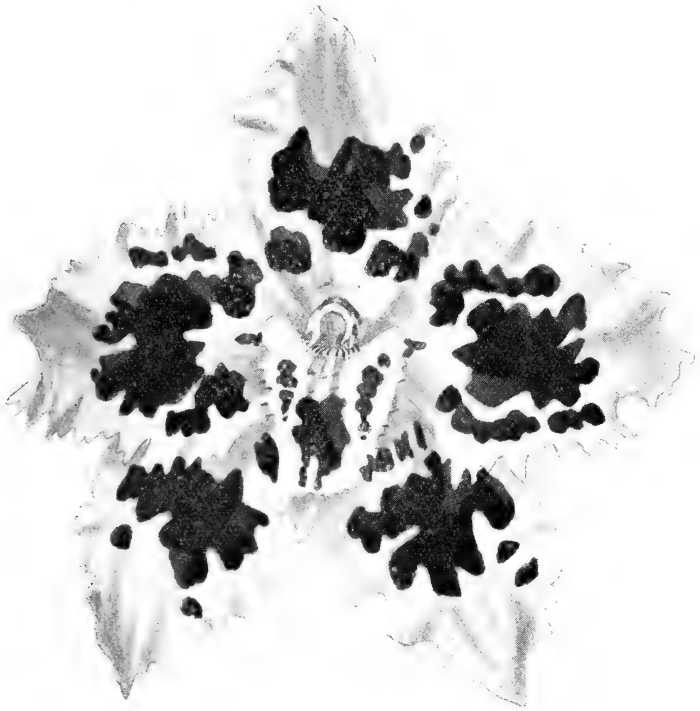


Fig. 62.—Odontoglossum crispum Cooksoniæ. (*Journal of Horticulture.*

To Messrs. Jas. Veitch, Chelsea, for hybrid Cypripediums, Lælio-Cattleyas, &c.

To Messrs. Hugh Low, Enfield, for a group of Orchids.

First-class Certificate.

To *Odontoglossum crispum Cooksoniæ* (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. H. J. Chapman). Probably the finest *Odontoglossum* yet seen. Flower four inches across and of fine substance; white tinged with purple at the back, and bearing large confluent reddish-purple blotches. Segments fringed. (Fig. 62.)

To *Dendrobium* × *Wiganiæ xanthochilum* (*nobile* × *signatum*) (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers bright yellow. Disc of lip maroon. Fig. 63.)

Award of Merit.

To *Odontoglossum* × *loochristyense* 'Lord Howick' (*crispum* × *triumphans*) (votes, unanimous), from Captain G. L. Holford (gr. Mr. Alexander). Flowers bright yellow with a few large brown blotches; lip white, with brown markings and yellow crest.

To *Lælio-Cattleya* × *Wellsiana magnifica* (*L. purpurata* × *C. Trianæi*) (votes, 12 for, 1 against), from Francis Wellesley, Esq. (gr. Mr. Gilbert). A fine flower, with sepals and petals tinged and veined with purple; front of lip ruby-purple.

Fig. 63.—Dendrobium Wiganiæ xanthochilum. (*Journal of Horticulture.*)

Cypripedium × 'Minos' 'Young's variety' (*Spicerianum* × *Arthurianum*) (votes, unanimous), from R. Briggs-Bury, Esq., Bank House, Accrington (gr. Mr. Wilkinson). Dorsal sepal white, with purple lines and a green base; petal and lip yellowish, tinged with purple.

To *Odontoglossum* × *Wilckeanum* 'Rex' (*crispum* × *luteo-purpureum*) (votes, 15 for, 2 against), from Messrs. Sander, St. Albans. Flowers cream colour blotched with brown. The spike bore sixteen flowers.

Botanical Certificate.

To *Bulbophyllum suavissimum*, from Sir Trevor Lawrence, Bart. A pretty species with slender sprays of cream-coloured, fragrant flowers. The plant bore eighteen spikes. Native of the Himalaya.

Cultural Commendation.

To Mr. W. H. White (gr. to Sir Trevor Lawerence, Bart.), for two large pans of the 'Jamaican' *Epidendrum polybulbon* and its variety *luteo-album.*

To Mr. Alexander (gr. to Captain G. L. Holford), for *Lycaste* × *Balliæ* 'Mary Gratrix' with seven flowers.

Other Exhibits.

Norman C. Cookson, Esq. (gr. Mr. H. J. Chapman), showed *Phaio-Calanthe* × 'Ruby' and a hybrid *Calanthe* flowering eleven months from the sowing of the seed.

Francis Wellesley, Esq., sent *Cattleya chocoensis* 'Westfield variety,' and *Cypripedium* × 'Hera Euryades.'

F. A. Rehder, Esq., showed *Cypripedium* × 'Ianthe' *superbum* and *C.* × 'Tia' (*exul* × 'Ianthe' *superbum*).

Messrs. Charlesworth staged a group of hybrid Orchids.

M. Louis Fournier, Marseilles, sent *Lælio-Cattleya* × *luminosa.*

Sir F. Wigan, Bart., showed *Cypripedium* × 'Eira' (*Chamberlainianum* × *concolor*).

W. M. Appleton, Esq., sent hybrid Cypripediums.

Messrs. Stanley, Ashton, showed *Odontoglossum* × *Ruckero-triumphans*

De B. Crawshay, Esq., showed *Odontoglossum triumphans* grown two years in a clear glass pot.

Sir Wm. Marriott sent *Dendrobium spectabile.*

ORCHID COMMITTEE, FEBRUARY 24, 1903.

Mr. HARRY J. VEITCH in the Chair, and twenty members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a group of Orchids.

To Messrs. Cypher, Cheltenham, for a group of Dendrobiums.

Silver Flora Medal.

To R. G. Thwaites, Esq., Streatham (gr. Mr. Black), for a group of Dendrobiums &c.

To Messrs. Sander, St. Albans, for a group of Orchids.

To Messrs. McBean, Cooksbridge, for a group of Odontoglossums &c.

Silver Banksian Medal.

To Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), for a collection of hybrid Dendrobiums &c.

To Captain G. L. Holford, Westonbirt (gr. Mr. Alexander), for a group of Orchids.

To Messrs. Jas. Veitch, Chelsea, for hybrid Orchids.

To Frank A. Rehder, Esq., Gipsy Hill (gr. Mr. Norris), for a group of Orchids.

To Messrs. Charlesworth, Heaton, Bradford, for a group of Orchids.

To Messrs. Hugh Low, for a group of Dendrobiums, Cattleyas, &c.

To Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. H. J. Chapman), for hybrid Orchids &c.

To De B. Crawshay, Esq., Sevenoaks (gr. Mr. Stables), for Odontoglossums.

First-class Certificate.

To *Zygopetalum crinitum cæruleum* (votes, 12 for, 3 against), from Messrs. Charlesworth. A very fine flower. Sepals and petals emerald-

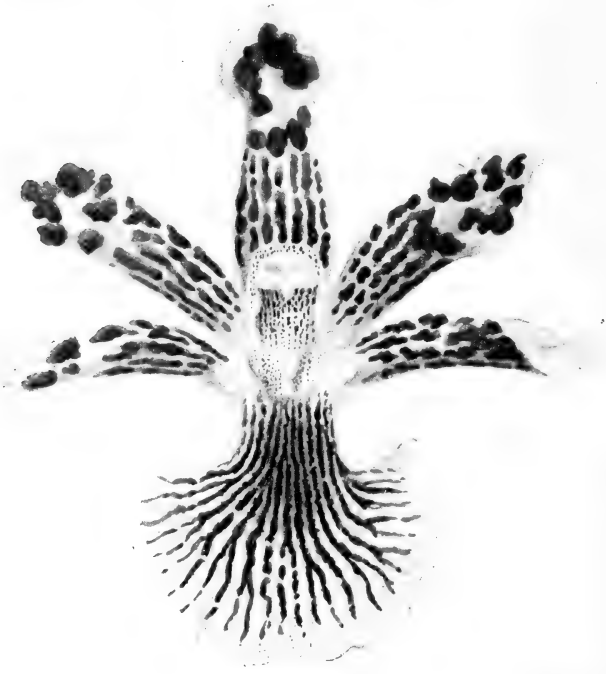


Fig. 64.—Zygopetalum crinitum cæruleum. (*Journal of Horticulture.*)

green, barred with brown. Lip large, white, with fringed lines of violet colour. (Fig. 64.)

To *Odontoglossum crispum* 'Grace Ruby' (votes, unanimous), from Messrs. McBean. Flowers with broad white sepals and petals evenly spotted with purple. (Fig. 65.)

Award of Merit.

To *Dendrobium* × 'Ophir' (*signatum* × *nobile*) (votes, 11 for, 4 against), from Captain G. L. Holford (gr. Mr. Alexander). Flowers cowslip-yellow with small brownish disc to the lip.

To *Dendrobium* × *melanodiscus* 'Sunray' (*Findlayanum* × *Ainsworthii* 'Woodhatch variety') (votes, 12 for, 4 against), from Mrs. Haywood, Reigate (gr. Mr. C. J. Salter). Sepals and petals white tipped with rose. Disc of lip maroon with yellow band.

To *Dendrobium* × *melanodiscus Salterii* (*Findlayanum* × *Ainsworthii splendidissimum*) (votes, unanimous), from Mrs. Haywood. Flowers bright rose, with white bases to the sepals and petals. Disc of lip orange with claret base.

To *Dendrobium* × *Ainsworthii splendidissimum* 'Mrs. Haywood' (*aureum* × *nobile*) (votes, 9 for, 4 against), from Mrs. Haywood. Flower heavily marked with purplish-lilac. Disc of lip maroon purple.

To *Dendrobium* × *Wiganianum album* (*nobile albiflorum* × *Hildebrandii*) (votes, unanimous), from R. G. Thwaites, Esq. Flowers white.

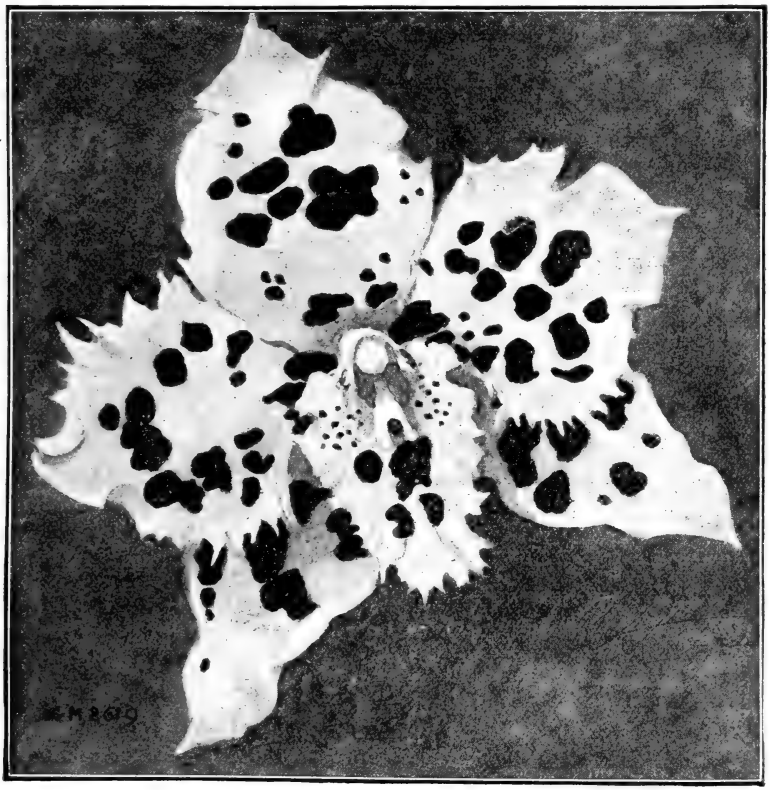


Fig. 65.—Odontoglossum crispum 'Grace Ruby.'

To *Phaius* × 'Clive' ('Norman' × *tuberculosus*) (votes, unanimous), from Norman C. Cookson, Esq. Sepals and petals yellow, slightly tinged with rose. Lip heavily spotted with chocolate at the base, the front being white spotted with dark rose.

Cultural Commendation.

To Mr. H. J. Chapman (gr. to Norman C. Cookson, Esq.), for *Phaius tuberculosus* with five spikes of flowers.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Gilbert), showed *Lælio-Cattleya* × *Charlesworthii* 'Westfield variety' and other Orchids.

J. Bradshaw, Esq. (gr. Mr. Whitelegge), showed varieties of *Cattleya Trianæi* &c.

H. Little, Esq. (gr. Mr. Howard), sent *Lælio-Cattleya* × 'Captain Percy Scott.'

Messrs. Stanley, Ashton, showed *Odontoglossum* × *Wilckeanum southgatense.*

Mrs. Haywood (gr. Mr. C. J. Salter) showed hybrid Dendrobiums.

ORCHID COMMITTEE, MARCH 10, 1903.

Mr. H. J. VEITCH in the Chair, and twenty-two members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To W. A. Bilney, Esq., Fir Grange, Weybridge (gr. Mr. Whitlock), for a fine group of Dendrobiums.

Silver Flora Medal.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a group of Orchids.

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for a group of Orchids.

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. W. P. Bound), for a group of Dendrobiums &c.

To Messrs. Charlesworth, Bradford, for a group of hybrid Orchids.

Silver Banksian Medal.

To Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), for hybrid Dendrobiums &c.

To De B. Crawshay, Esq., Sevenoaks (gr. Mr. Stables), for Odontoglossums.

To Messrs. Jas. Veitch, for a group of Orchids.

To Mr. J. Cypher, for a collection of Dendrobiums.

To Messrs. Hugh Low, for a group of Orchids.

First-class Certificate.

To *Cattleya* × 'Enid' *magnifica* (*Warscewiczii* × *Mossiæ*) (votes, unanimous), from Messrs. Charlesworth, Bradford. A fine flower, with sepals and petals bright rose. Lip large, crimped at the edge, dark rose-purple with lavender margin. (Fig. 66.)

Award of Merit.

To *Dendrobium* × *Thwaitesiæ* (*Ainsworthii splendidissimum* × *Wiganiæ*), from R. G. Thwaites, Esq., Streatham (gr. Mr. Black). In this, notwithstanding the presence of *D. nobile* in both the parents, the *D. signatum* shows its yellow colour and wax-like substance in a remarkable degree. Flower yellow, slightly tinged with purple. Disc of the lip claret colour. (Fig. 67.)

To *Odontoglossum Rossii* 'Low's variety' (votes, 13 for, 4 against),

from Messrs. Hugh Low. Sepals and bases of the petals spotted with green, the rest of the flower white.

Fig. 66.—Cattleya 'Enid' magnifica. (*The Garden.*)

Botanical Certificate.

To *Bulbophyllum occultum*, from H. T. Pitt, Esq. A singular species, the bracts of the flower-spikes forming triangular heads, each purplish flower being partly concealed beneath a bract.

Cultural Commendation.

To Mr. Thurgood, gr. to H. T. Pitt, Esq., for *Dendrobium aggregatum majus* with twenty fine spikes of rich yellow flowers.

To the Royal Botanic Society, Regent's Park (gr. Mr. E. F. Hawes), for a large specimen of *Cœlogyne cristata.*

Other Exhibits.

Norman C. Cookson, Esq. (gr. Mr. H. J. Chapman), sent *Odontoglossum* × *Rolfeæ* 'Oakwood variety,' and *Phaius* × 'Norman' *pulcherrimus.*

Francis Wellesley, Esq. (gr. Mr. Gilbert), sent *Lælio-Cattleya* × *Gottoiana* 'Westfield variety,' and *Cypripedium* × 'Ville de Paris.'

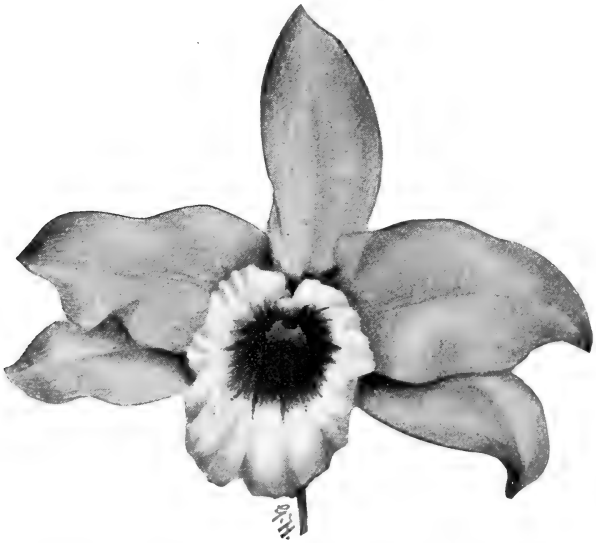


Fig. 67.—Dendrobium × Thwaitesiæ. (*The Garden.*)

J. Rutherford, Esq., M.P. (gr. Mr. Lupton), showed *Odontoglossum* × 'Queen Alexandra' (*Harryanum* × *triumphans*).

R. I. Measures, Esq. (gr. Mr. Smith), showed *Cypripedium* × *vill-exul* (*villosum* × *exul*).

Messrs. de Graaff Bros., Leiden, sent *Habenaria Bonatea.*

M. Fl. Claes, Brussels, showed four hybrid Odontoglossums.

Mr. Jas. Douglas, Great Bookham, sent *Dendrobium* × 'Florence' (*nobile album* × *Bensoniæ*).

Mr. A. J. Keeling showed hybrid Cypripediums.

C. J. Lucas, Esq., Horsham (gr. Mr. Duncan), showed *Cypripedium* × *Chapmanii* 'Arddarroch variety.'

ORCHID COMMITTEE, MARCH 24, 1903.

Mr. HARRY J. VEITCH in the Chair, and twenty-three members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. H. J. Chapman), for a fine group of hybrid Phaius, Odontoglossums, &c.

FIG. 68.—CYMBIDIUM EBURNEO-LOWIANUM CONCOLOR. (*The Garden.*)

Silver Flora Medal.

To Captain G. L. Holford, C.I.E., Westonbirt (gr. Mr. Alexander), for a group of Odontoglossums &c.

To H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), for a group of Orchids.

To Mr. Jas. Cypher, Cheltenham, for a group of Dendrobiums.

Silver Banksian Medal.

To Messrs. Sander and Sons, St. Albans, for a group of Orchids.

To Mr. Otto Beyrodt, Berlin, for Odontoglossums.

First-class Certificate.

To *Cymbidium* × *eburneo-Lowianum concolor* (*eburneum* × *Lowianum concolor*) (votes, unanimous), from Captain G. L. Holford (gr. Mr. Alexander). Flowers large, yellowish-cream colour, with purplish marking on the front of the lip. (Fig. 68.)

Award of Merit.

Phaius × 'Harold' ('Norman' × *Sanderianus*) (votes, 13 for, 3 against), from Norman C. Cookson, Esq. (gr. Mr. H. J. Chapman). Sepals and petals, reddish-copper colour, lighter at the backs. Lip reddish-purple with yellow lines.

To *Cymbidium* × *Low-grinum* (*tigrinum* × *Lowianum*) (votes, 12 for, 3 against), from R. I. Measures, Esq., Camberwell (gr. Mr. Smith). Plant and flower resembling *C. tigrinum*, but more robust. Sepals and petals yellowish-green; lip white, with brown marking on the front lobe.

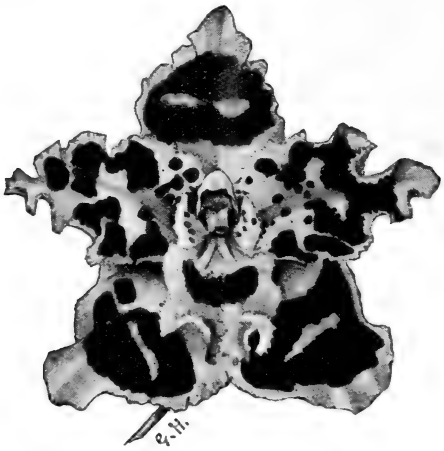


Fig. 69.—Odontoglossum Adrianæ 'Swoboda.' (*The Garden.*)

To *Odontoglossum* × *Adrianæ* 'Swoboda' (votes, unanimous), from Mr. Otto Beyrodt, Marienfelde, Berlin. Sepals and petals whitish, tipped with yellow, and bearing broad brown markings. Lip white, with brown spots. (Fig. 69.)

Cultural Commendation.

To Mr. H. J. Chapman, gr. to Norman C. Cookson, Esq., for *Phaius* × *Cooksonii* with thirteen spikes of flowers. (Fig. 70.)

To Mr. Cleverley, gr. to M. Fournier, Marseilles, for *Cymbidium* × *eburneo-Lowianum* with two spikes produced within three years from the sowing of the seed.

Other Exhibits.

The Hon. Walter Rothschild, M.P. (gr. Mr. E. Hill), again showed *Lælio-Cattleya* × *Digbyano-Mendelii* 'Tring Park variety.'

Messrs. Jas. Veitch staged a collection of hybrid Orchids.

Francis Wellesley, Esq. (gr. Mr. Gilbert), showed *Lycaste Skinnerii* 'Westfield variety.'

R. G. Thwaites, Esq. (gr. Mr. Black), sent *Dendrobium nobile Murrhinianum.*

De B. Crawshay, Esq. (gr. Mr. Stables), showed Odontoglossums.

J. Rutherford, Esq., M.P. (gr. Mr. Lupton), sent *Odontoglossum* × *beardwoodiense.*

Sir F. Wigan, Bart. (gr. Mr. W. H. Young), showed a fine specimen of *Megaclinium falcatum.*

Fig. 70.—Phaius Cooksonii. (*Journal of Horticulture.*)

F. W. Moore, Esq., Royal Botanic Gardens, Glasnevin, Dublin, showed a fine spike of *Eulophiella Peetersiana.*

Messrs. Hugh Low staged a collection of Orchids.

Orchid Committee, April 7, 1903.

Mr. H. J. Veitch in the Chair, and twenty-two members present.

Awards Recommended :—

Silver Flora Medal.

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. W. P. Bound), for a group of Orchids.

Silver Banksian Medal.

To Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), for Masdevallias &c.

To Captain G. L. Holford, C.I.E. (gr. Mr. Alexander), for Odontoglossums and other Orchids.

To De B. Crawshay, Esq., Sevenoaks (gr. Mr. Stables), for a group of Odontoglossums, Sophronitis, &c.

To Messrs. J. and A. A. McBean, Cooksbridge, for a group of Odontoglossums.

First-class Certificate.

To *Odontoglossum crispum* 'Persimmon' (votes, unanimous), from H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood). Flower four-and-a-half inches across, white, with clusters of purplish-brown spots on each segment. Petals and lip fringed. (Fig. 71.)

FIG. 71.—ODONTOGLOSSUM CRISPUM 'PERSIMMON.' (*The Garden.*)

Award of Merit.

To *Odontoglossum crispum* 'Alpha' (votes, 18 for, 2 against), from H. T. Pitt, Esq. A near ally of *O. c. Stevensii.* Flower white, spotted with brown.

To *Odontoglossum triumphans Crawshayanum* (votes, 18 for, 3 against), from De B. Crawshay, Esq., Sevenoaks (gr. Mr. Stables). A very large yellow flower, heavily barred with dark brown.

To *Odontoglossum* × *Adrianæ* 'Lady Wantage' (votes, unanimous),

from Captain G. L. Holford, C.I.E. (gr. Mr. Alexander). Flowers large, pale yellow, spotted with brown. Petals and lip fringed.

To *Cypripedium* × 'Mrs. Pitt' (parentage unrecorded) (votes, unanimous), from H. T. Pitt, Esq. (gr. Mr. Thurgood). Flowers cream-coloured, with purple markings; lip light yellow. (Fig. 72.)

To *Masdevallia* × *Veitchiano-Wageneri* (*Veitchianum* × *Wageneri-anum*) (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Plant of dwarf habit. Profuse bloomer. Flowers apricot-yellow.

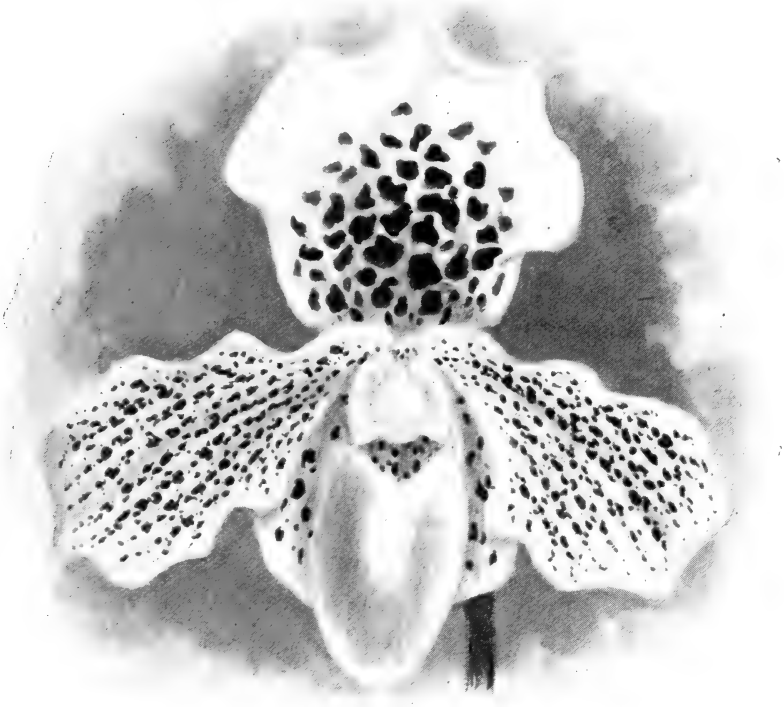


Fig. 72.—Cypripedium × 'Mrs. Pitt.' (*Journal of Horticulture.*)

Botanical Certificate.

To *Masdevallia xipheres*, from Sir Trevor Lawrence, Bart. Of the *M. muscosa* section. Flowers small, purple.

Cultural Commendation.

To Mr. Alexander, gr. to Captain G. L. Holford, C.I.E., for *Odontoglossum* × *Adrianæ* 'Lady Wantage' with a branched spike of twenty flowers.

To Mr. Norris, gr. to F. A. Rehder, Esq., for *Dendrobium nobile Balli-anum* with sixty-seven flowers.

Other Exhibits.

H. T. Pitt, Esq. (gr. Mr. Thurgood), showed rare Odontoglossums.

Mr. Otto Beyrodt, Marienfelde, Berlin, staged hybrid Odontoglossums.

Baron Sir H. Schröder (gr. Mr. Ballantine) sent a collection of cut spikes of rare Odontoglossums.

Sir Frederick Wigan, Bart. (Mr. W. H. Young), showed *Cattleya Lawrenceana Hyeana* and *C. Trianæi Amesiana.*

Messrs. Jas. Veitch sent *Dendrobium* × *Aspasia pallida* and *D.* × *Wiganiæ grandiflorum.*

W. P. Burkinshaw, Esq. (gr. Mr. Barker), showed *Lælio-Cattleya* × *Digbyano-Mossiæ*, 'Hessle variety.'

Messrs. Charlesworth staged hybrid Orchids.

F. Wellesley, Esq. (gr. Mr. Gilbert), showed *Cattleya intermedia nivea.*

Geo. Singer, Esq. (gr. Mr. Collier), showed a good *Odontoglossum* × *Adrianæ.*

A resolution was passed by the Committee to the effect that in future obviously mutilated Orchids (number of flowers reduced) should not be adjudicated upon.

ORCHID COMMITTEE, APRIL 21, 1903.

Mr. HARRY J. VEITCH in the Chair, and seventeen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Charlesworth, Bradford, for a group of hybrid Orchids.

Silver Banksian Medal.

To R. W. Hudson, Esq., Danesfield, Marlow (gr. Mr. J. Gibson,) for a group of *Dendrobium Wardianum.*

To W. M. Low, Esq., Wellesbourne (gr. Mr. Liney), for a finely flowered group of *Dendrobium nobile.*

To Messrs. Hugh Low, for a group of Orchids.

First-class Certificate.

To *Dendrobium* × 'Venus' *grandiflorum* (*nobile* × *Falconeri*) (votes, 11 for, 2 against), from Norman C. Cookson, Esq. (gr. Mr. H. J. Chapman). Flowers large, white, heavily marked with purplish-rose on the outer halves of the segments. Disc of lip maroon.

Award of Merit.

To *Lælio-Cattleya* × 'Dora' *magnifica* (*L.-C.* × 'Hippolyta Phœbe' × *C. Schröderæ*) (votes unanimous) from Messrs. Charlesworth. Flowers several on a spike, salmon-tinted orange, with ruby-red markings on the lip. (Fig. 73.)

Other Exhibits.

Norman C. Cookson, Esq. (gr. Mr. H. J. Chapman), showed the spotted *Odontoglossum crispum* 'Jeanette.' Messrs. Jas. Veitch showed *Cypripedium* × 'Little Gem' (*Harrisianum superbum* × 'Baron Schröder'); and *Lælia* × *Digbyano-purpurata* 'Duke of Connaught.'

Francis Wellesley, Esq. (gr. Mr. Gilbert), sent *Lælia* × 'Iona' *nigrescens.*

J. Colman, Esq. (gr. Mr. W. P. Bound), showed *Acineta Humboldtii*. Captain C. C. Hurst sent *Lælia-Cattleya* × *Hyeana*.

Fig. 73.—Lælio-Cattleya 'Dora' magnifica. (*The Garden.*)

Mr. J. W. Moore, Rawdon, sent two spotted Odontoglossums. R. I. Measures, Esq., showed *Cypripedium* × *Harri-exul*.

Orchid Committee, May 5, 1903.

Mr. Harry J. Veitch in the Chair, and nineteen members present.

Awards Recommended :—

Silver Flora Medal.

To Captain G. L. Holford, C.I.E., Westonbirt (gr. Mr. Alexander), for a group of Odontoglossums &c.

To Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young), for a group of Orchids.

To H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), for a group of Orchids.

To Messrs. Jas. Veitch for hybrid and other Orchids.

Silver Banksian Medal.

To Messrs. Charlesworth, Bradford, for a collection of Odontoglossums and hybrid Orchids.

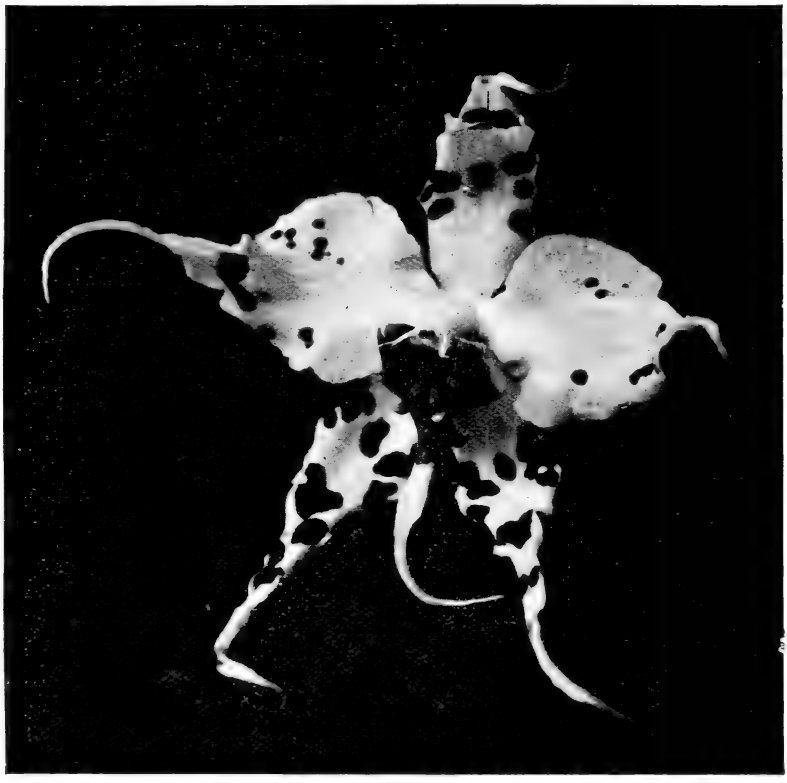


FIG. 74.—ODONTOGLOSSUM CIRRHOSUM 'PITT'S VARIETY.' (*The Garden.*)

Award of Merit.

To *Odontoglossum cirrhosum* 'Pitt's variety' (votes, unanimous) Flowers large; the petals very broad, white, with purple markings. (Fig. 74.)

To *Odontoglossum* × 'Queen Alexandra' 'Rutherford's variety' (? *triumphans* × *Harryanum*), from J. Rutherford, Esq., M.P., Blackburn (gr. Mr. Lupton). Sepals and petals yellow, barred with brown, much as in *O. triumphans*. Lip white, with reddish-purple markings at the base. The record of parentage was given as *O. excellens* × *O. Harryanum*, but the Committee considered it *O. triumphans* instead of *O. excellens*.

Botanical Certificate.

To *Megaclinium Imschootianum*, from H. T. Pitt, Esq. (gr. Mr. Thurgood). A singular species with triangular pseudobulbs and stout ascending spikes, the upper halves of which are flat blades with a single row of yellowish flowers on each side, with acuminate purplish tips to the sepals.

Cultural Commendation.

To Mr. Alexander, gr. to Captain G. L. Holford, for a specimen of *Odontoglossum crispum* with six flower-spikes, bearing together one hundred and twenty-nine flowers.

Other Exhibits.

De B. Crawshay, Esq. (gr. Mr. Stables), again showed his fine *Odontoglossum triumphans* 'Lionel Crawshay.'

J. Rutherford, Esq., M.P. (gr. Mr. Lupton), showed *Odontoglossum* × *Adrianæ beardwoodiense.*

Captain J. C. Stringer, Kenilworth (gr. Mr. Holland), showed the finely coloured *Miltonia vexillaria* 'Park Hill variety.'

Messrs. B. S. Williams sent *Cypripedium* × *polito-Sallierii.*

Messrs. Hugh Low showed *Odontoglossum* × *Wendlandianum.*

Messrs. Linden, Brussels, showed *Cypripedium* × *Gordonii* (*Chamberlainianum* × *œnanthum*) and several Odontoglossums.

ORCHID COMMITTEE, MAY 19, 1903.

Mr. H. J. VEITCH in the Chair, and twenty-one members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill, for a group of Orchids.

Silver Flora Medal.

To the Hon. Walter Rothschild, M.P. (gr. Mr. E. Hill), for a group of hybrid Masdevallias.

To Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. H. J. Chapman), for a group of hybrid Phaius, Odontoglossums, &c.

To Walter C. Walker, Esq., Winchmore Hill (gr. Mr. Geo. Cragge), for a group of *Odontoglossum crispum.*

To Messrs. Hugh Low for a group of Orchids.

Award of Merit.

To *Odontoglossum crispum* 'Harold' (votes, unanimous), from Norman C. Cookson, Esq. (gr. Mr. H. J. Chapman). Flowers of fine form, all the segments fringed, the lower halves of the lateral sepals being toothed, and bearing yellow and brown markings like the crest of the lip; all the segments spotted with red-brown.

To *Odontoglossum crispum* 'Lady Moncreiffe,' from Sir Robert D. Moncreiffe, Bart., Bridge of Earn, N.B. (gr. Mr. A. Common). Flowers

large, white tinged with purple, the sepals each bearing one large, and the petals a smaller reddish blotch.

To *Odontoglossum* × *Wattianum Crawshayanum* (*Lindleyanum* × *Harryanum*) (votes, unanimous), from De B. Crawshay, Esq., Sevenoaks, (gr. Mr. Stables). Flowers yellow, closely marked with brown; lip whitish, with a large purple blotch at the base.

To *Dendrobium glomeratum* (votes, 12 for, 2 against), from Messrs. Hugh Low. A showy species, with clusters of rose-purple flowers produced on the leafless pseudobulbs.

Botanical Certificate.

To *Trigonidium spatulatum* from H. T. Pitt, Esq. (gr. Mr. Thurgood). A singular species with the terminal flower having the sepals reflex at the tip and tinged with purple.

Other Exhibits.

Leopold de Rothschild, Esq. (gr. Mr. Jas. Hudson), showed *Lælio-Cattleya* × 'Hippolyta var. Phœbe.'

Sir Robert D. Moncreiffe, Bart. (gr. Mr. A. Common), sent fine cut spikes of Odontoglossums.

Francis Wellesley, Esq. (gr. Mr. Gilbert), sent *Cattleya Mossiæ Arnoldi* 'Westfield variety' (Fig. 75) and *C. Skinnerii alba* 'Minnie.'

Col. Brymer, M.P. (gr. Mr. Powell), sent varieties of *Thunia Marshalliana.*

H. J. Elwes, Esq., Colesborne, showed *Thunia Marshalliana*, and *T. M. aurantiaca*, a much finer flower.

F. W. Moore, Esq., Royal Botanic Gardens, Glasnevin, sent *Eria Kingii*, a close ally of *E. aeridostachya*, Rchb. f.

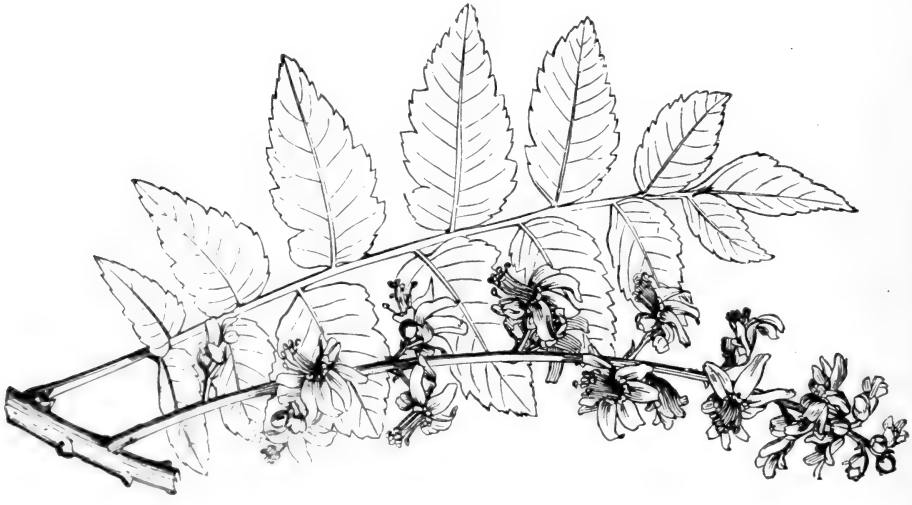


FIG. 75.—CATTLEYA MOSSIÆ ARNOLDI 'WESTFIELD VARIETY.'

(*To face page* XC)

NARCISSUS AND TULIP COMMITTEE.

March 10, 1903.

Mr. H. B. May in the Chair, and eleven members present.

The question of classification was brought forward by Mr. J. Pope and discussed at some length, the result being an unanimous agreement that in future all Narcissi receiving Certificates or Awards of Merit should be classified (so far as possible) directly they obtain official recognition. This was considered highly desirable in the interests of Daffodil exhibitors and the Fellows of the Society generally.

Considering the large amount of work coming before the Committee each year at the two April meetings, the Chairman was requested to lay before the Council a recommendation that at the April meetings of 1904 the Committee should meet at 11.30 a.m. instead of at 12 o'clock.

Award Recommended :—

Silver Flora Medal.

To Messrs. Cutbush, Highgate, N., for a large group of Narcissi, in pots. In this collection varieties of the ' Ajax ' and *incomparabilis* sections were most in evidence.

Other Exhibits.

Early flowering Dutch Tulips, grown in pots, were exhibited by Messrs. Williams, Upper Holloway.

Daffodils and Tulips grown in small jars, without drainage, and in a preparation of crushed shell and peat-moss, were shown by Mr. Sydenham, Tenby Street, Birmingham.

Mr. W. B. Hartland, Patrick Street, Cork, sent flowers of *Narcissus maximus*, produced by bulbs collected in 1886, and stated that the wild bulbs improved under cultivation, whereas the Dutch stocks of this Daffodil generally died out after two or three years' culture. The Committee recognised these flowere as representing the Pyrenean form of *maximus*. From the same exhibitors came blooms of a seedling named *Nelsoni lutea*, said to have "originated between trumpet *maximus* and a *Leedsii*" : these had suffered considerably during the long journey.

Narcissus and Tulip Committee, March 24, 1903.

Mr. H. B. May in the Chair, and sixteen members present.

A letter from Mr. P. R. Barr was read in which he asked the Committee to fix a day and hour for the discussion of a scheme of Daffodil Classification. He urged that the time had arrived when it was necessary for purposes of description and identification, and also for the guidance of

schedule framers, to subdivide the three great sections arranged by Mr. G. J. Baker, V.M.H., and lay down rules defining each division. Mr. Barr further stated that he and Mr. F. W. Burbidge were drafting such a scheme of classification, and hoped to place a copy in the hands of each member of the Committee previous to the meeting of April 7.

It was agreed that the subject be brought forward for discussion on April 7.

Awards Recommended:—

Silver Flora Medal.

To Miss Currey, Lismore, Ireland, for an extensive collection of Daffodils. The flowers were fresh and bright, but somewhat small. *Leedsii* and *Barrii* varieties were well represented, as also were the earlier of the trumpet Daffodils.

To Messrs. Barr, Covent Garden, for a large display consisting of Darwin Tulips, grown in pots, and a collection of Daffodils. In the latter the flowers were arranged in shallow bowls—the bases of the stems made fast in lead clips—beneath a covering of fresh green moss.

Silver Banksian Medal.

To Messrs. Ware, Hale Farm, Feltham, for a collection of Daffodils, chiefly early trumpet varieties, arranged with early flowering alpines.

To Mr. Sydenham, Tenby Street, Birmingham, for a group illustrating his method of cultivating Tulips and Narcissi in fancy pots and jars, without drainage, in a mixture of moss fibre and crushed shell as a rooting medium.

To Mr. Reuthe, Fox Hill, Keston, Kent, for a group of early Daffodils.

Award of Merit.

To Daffodil 'Firelight' (votes, 11 for), from Mrs. Backhouse, Sutton Court, Hereford. This *incomparabilis* form resembles 'C. J. Backhouse,' but has a richer orange-shaded crown and soft yellow perianth segments.

To Daffodil 'Mohican' (votes, 12 for), from Mrs. Backhouse. An early *Burbidgei* variety, with flowers of large size and good substance; perianth segments broad creamy-white; cup small, yellow with orange rim.

To Daffodil 'Janet Image' (votes, 11 for, 1 against), from Messrs. Barr; a large-flowered *Leedsii* variety, with broad and stout perianth segments which are pale sulphur-yellow; the cup is yellow—a light but bright shade.

Other Exhibits.

Mrs. Backhouse staged several new seedling Daffodils, 'Border Red,' 'Early Poeticus,' and 'Cecil Hull' being the most noteworthy.

The Rev. G. H. Engleheart, Dinton, Wilts, sent two new Daffodils, 'Plenipo' and 'Lucca,' the former an effective double variety very like 'Sulphur Phœnix,' the latter an ivory-white trumpet.

Messrs. Wallace, Colchester, exhibited *Tulipa præstans*, an early, flowering species with vermilion-scarlet flowers. This the Committee wished to see again.

Messrs. Barr submitted a "Daffodil Bulb Planter," a strong steel tool

with wooden handle, designed to facilitate the planting of bulbs in grass. Several of the members commented favourably upon the "Planter" after a practical experience with it.

NARCISSUS AND TULIP COMMITTEE, APRIL 7, 1903.

Mr. H. B. MAY in the Chair, and fifteen members present.

Awards Recommended.

Silver-gilt Flora Medal.

To Miss Currey, Lismore, Ireland, for an especially fine exhibit of Irish-grown Daffodils. The flowers were remarkably fresh, notwithstanding their long journey, and the colours were unusually bright. One hundred and twenty varieties were represented, some of the finest being 'Glory of Leiden,' 'Duke of Bedford,' 'W. J. Milner,' 'Katherine Spurrell,' 'Apricot,' 'Vesuvius,' 'Redcoat,' 'Sir Watkin,' 'Maximus,' 'Princess Mary,' and 'C. W. Cowan.'

Silver-gilt Banksian Medal.

To Mr. Charles Dawson, Gulval, Penzance, for a group of Daffodils, the flowers good, alike in size, colour, and substance. 'White Queen,' 'Horace,' Cassandra,' 'Homespun,' 'Will Scarlett,' 'White Lady,' 'Granite,' and 'Dorothy Kingsmill' were conspicuous in this exhibit.

Silver Flora Medal.

To Messrs. Barr, Covent Garden, for a collection of Daffodils, including many new varieties, notably 'Peter Barr,' a large white trumpet Daffodil.

Silver Banksian Medal.

To J. Kingsmill, Esq., Sharow, Ripon, for a small group of finely grown Daffodils.

Award of Merit.

To *Tulipa præstans* (votes, 14 for, 1 against), from Miss Willmott, V.M.H., Warley Place, Great Warley. A species from Bokhara, about 1 ft. high, and with large flowers wholly of a rich vermilion-scarlet colour, segments somewhat pointed, one of Mr. Engleheart's seedlings.

To Daffodil 'Viscountess Falmouth' (votes, 13 for), from Miss Willmott, V.M.H. A silvery white *Leedsii* variety with pointed perianth segments; a charming flower.

To Daffodil 'King's Norton' (votes, 12 for), from Messrs. Pope, King's Norton. This is a very large flowered variety, belonging to the *Ajax* group: it is wholly of a rich golden-yellow colour, has broad perianth segments, and a prettily frilled trumpet mouth.

To Daffodil 'Zingara' (votes, 12 for), from Mrs. Backhouse, Sutton Court, Hereford. A variety with fine white perianth segments, and a broad, orange, crimson-tipped cup; a beautiful *poeticus* hybrid.

To Daffodil 'Symmetry' (votes, unanimous), from Rev. G. H. Engleheart, V.M.H., Dinton, Wilts. A finely proportioned *incomparabilis*

variety, with cream-coloured perianth segments, and a handsome, yellow, orange-rimmed cup.

To Daffodil 'Red Disc' (votes, 14 for, 2 against), from Rev. G. H. Engleheart. A particularly striking Daffodil, with very refined flowers; perianth segments broad, rounded, and soft yellow; cup very wide, rich orange-red, with yellow centre.

To Daffodil 'Lady Gore-Booth' (votes, unanimous), from Rev. G. H. Engleheart. This also is a finely proportioned broad-cupped variety; perianth segments broad, rounded, and rich creamy-yellow; cup lemon-yellow. When shown before the Committee it was under the name 'Bodyguard,' but this has since been changed to 'Lady Gore-Booth.'

Other Exhibits.

The Rev. G. H. Engleheart, V.M.H., staged a large number of new seedling Daffodils; besides those gaining awards, 'Lancer,' 'Gold Eye,' 'Argent,' and 'Sun's Eye' were the most attractive.

Miss Willmott, V.M.H., Warley Place, Great Warley, exhibited 'Cyprian,' 'Lord Muncaster,' and 'Norma,' three new seedling Daffodils raised by Mr. Engleheart.

Messrs. Pope, King's Norton, brought 'Clarissa,' and 'Orange Star,' two new seedling Daffodils, the last-named having a very rich-hued cup.

Mr. Walker, Thame, sent Daffodil 'Primrose Phœnix,' a good double form.

S. B. Kendall, Esq., Stanhope Gardens, S.W., contributed a vase of superb flowers of Daffodil 'King Alfred,' as well as blooms of 'Queen Alexandra.'

Messrs. de Graaff, Leiden, sent Daffodil 'Stella' *flore pleno*.

Mrs. Backhouse, Sutton Court, Hereford, staged 'Esmeralda,' 'Bright-eye,' and served other seedling Daffodils, all of *poeticus* parentage.

The meeting for the discussion of Daffodil Classification was held at 3.45 P.M., Mr. H. B. May in the chair.

A scheme was propounded by Mr. F. W. Burbidge, M.A., V.M.H., and Mr. P. R. Barr, by whom, with the assistance of Mr. J. W. Barr, it had been drawn up. A brisk discussion ensued, but as the propriety of formulating a scheme prior to the request or sanction of the Council was questioned, and as opinions of the need for a further and more detailed scheme of classification than the existing one were equally divided, for and against, the meeting concluded with a request that the Chairman would bring the subject before the Council.

NARCISSUS AND TULIP COMMITTEE, APRIL 21, 1903.

Mr. H. B. MAY in the Chair, and eighteen members present.

The competition for the Barr Daffodil Cup was arranged for this date, but as there was only one entry the Cup was withheld in accordance with the Regulations published on p. 60 of the 'Arrangements for 1903.' The one group staged, by R. H. Darlington, Esq. (gr. Mr. David Bignell), Park

House, Little Heath, Potter's Bar, was so well arranged, and contained such a good selection of varieties, all well represented, that the Committee unanimously recommended the award of a Silver Flora Medal.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Bath, for an extensive group of Daffodils in which were good blooms of 'Weardale Perfection,' 'Autocrat,' 'Katherine Spurrell,' 'Princess May,' 'Capt. Nelson,' 'Madame de Graaff,' 'Horsfieldi,' &c.

To R. H. Darlington, Esq., Potter's Bar, for an exhibit of well-grown, fresh, and bright flowers arranged prettily in small glass vases. The group contained thirty-one varieties, a few of the finest being 'Duchess of Westminster,' 'Sir Watkin,' 'Maximus,' 'Mrs. Langtry,' 'Albicans,' 'Beauty,' 'Madame de Graaff,' 'Princeps,' 'Sulphur Phœnix,' and 'Emperor.'

Silver Banksian Medal.

To Messrs. Hogg and Robertson, Dublin, for a group of Daffodils and early Tulips. 'Cloncurry,' 'Dorothy Yorke,' 'Queen of Spain,' 'Brigadier,' 'Flamingo,' 'White Wings,' and 'Countess of Cadogan,' were choice Daffodils well represented. 'Mrs. H. D. Betteridge,' a new white-trumpet variety, was also shown, but there was only one bloom of it on view.

To Messrs. Barr, Covent Garden, for a display of Daffodils and Tulips, the latter arranged in two attractive groups on either side of the former. 'Agnes Barr,' 'Maggie May,' 'Cassandra,' 'Gloria Mundi,' 'Mrs. C. Bowley,' 'Madame de Graaff,' the beautiful little *Narcissus triandrus calathinus* were conspicuous among the Daffodils.

To Messrs. James Veitch, King's Road, Chelsea, for a group of bright and well-grown Daffodils.

Award of Merit.

To Daffodil 'The Moonstone' (Engleheart) (votes, unanimous), from Miss Willmott, V.M.H., Warley Place, Great Warley, Essex. A lovely pure white variety with semi-drooping flowers; the cup is three-quarters of an inch deep, and prettily frilled.

To Daffodil 'Lilian' (Engleheart) (votes, unanimous), from Miss Willmot. A bold *Ajax* variety with broad creamy-white perianth segments and a sulphur-yellow trumpet, frilled at the mouth.

To Daffodil 'Strongbow' (Engleheart) (votes, unanimous), from Miss Willmott. An *Ajax* variety, but with a rather short rich yellow trumpet, and broad white perianth segments.

To Daffodil 'Adour' (votes, unanimous), from Miss Willmott. This may best be described as a fine late-flowering *maximus*, but it has bolder perianth segments than the latter. The whole flower is brilliant golden-yellow.

To Daffodil 'Rev. Chas. Digby' (Engleheart) (votes, unanimous), from Miss Willmott. A variety with a deep and long trumpet of a soft citron-yellow colour and white perianth segments, which shade to yellow at their base. A very refined flower, a *triandrus* hybrid.

To Daffodil 'Cleopatra' (votes, 8 for), from Messrs. Barr. A bold and large-flowered trumpet Daffodil, somewhat like 'Emperor' in form and pose, but having broad, soft yellow perianth segments, and a fine soft, golden-yellow trumpet with a broadly recurving rim.

To Daffodil 'Mrs. George Barr' (votes, unanimous), from Messrs. Barr. This is another of the white *Ajax* varieties: it has broad, pointed, white perianth segments, which come forward somewhat and reflex slightly at the margins; the trumpet is broad, smooth, frilled at the mouth, and of a creamy-white shade.

To Daffodil 'Branston' (votes, unanimous), from A. S. Leslie Melville, Esq., Branston Hall, Branston, Lincoln. A beautiful *Barrii* variety with broad glistening white perianth segments, which are margined with yellow towards the base; the cup is frilled, deep yellow, with a rich orange rim. Sent as a sport or seedling from *Barrii conspicuus*, a variety it closely resembles in all but colour.

Other Exhibits.

Miss Willmott contributed other new Daffodils besides those already noted; among them the variety 'Waterwitch' (Engleheart) attracted a good deal of attention, and the Committee expressed a wish that they might see it again.

Miss Katherine Spurrell, Bessingham, Hanworth, Norwich, sent Daffodil 'Marcus Allen.'

M. Litchfield, Esq., Ballymaloe, Cloyne, Co. Cork, forwarded a double Daffodil for naming: this was identified as 'Primrose Phœnix.'

F. Barnard, Esq., The Mount, Uckfield, Sussex, sent Daffodil 'Orange Prince,' a variety with a brilliant orange cup, but the flowers were much past their best.

Mr. W. B. Hartland, Cork, sent blooms of Daffodil 'Orestes.'

Narcissus and Tulip Committee, May 5, 1903.

Mr. H. B. May in the Chair, and sixteen members present.

The Chairman reported that, in reply to the question whether the Committee should deal with a more detailed scheme of classification than that arranged by Mr. J. G. Baker, F.R.S., after the Daffodil Conference of 1884, the Council expressed a wish that nothing further should at present be done in the matter.

Two interesting points in connection with the exhibition of new Daffodils were discussed. On an expression of opinion being taken it was unanimously agreed, on the proposition of the Rev. G. H. Engleheart, V.M.H., seconded by Mr. James Walker, V.M.H., to recommend to the Council that while three flowers should be sufficient to enable a meritorious variety to qualify for an Award of Merit, no variety should gain a First-class Certificate unless at least six blooms of it be placed before the Committee.

The second question had reference to the association of Daffodil foliage with the flowers of new varieties brought forward for awards. It was pointed out that flowers of varieties producing slender leafage were not

infrequently displayed with foliage cut from a much more robust Daffodil, and that this practice was misleading to the general public. The result of this discussion was a recommendation to the Council that in future all Daffodils submitted for awards be exhibited either with their own foliage or without foliage at all.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Barr, Covent Garden, for a splendid exhibit of late varieties of Daffodil, flanked with small collections of well-grown Tulips.

Silver-gilt Banksian Medal.

To Messrs. Bath, Wisbech, for a collection of clean and bright Daffodils that included a fine collection of late-flowering varieties.

Silver Flora Medal.

To Messrs. Hogg and Robertson, Dublin, for a group of Daffodils and Tulips. Among the former were flowers of the new white *Ajax* variety, 'Mrs. H. D. Betteridge.'

To Messrs. James Veitch, Chelsea, for a large group of Daffodils, composed chiefly of the more popular varieties.

Silver Banksian Medal.

To Messrs. Bull, King's Road, Chelsea, for a small group of showy bedding Tulips.

Award of Merit.

To Daffodil 'Count Visconti' (Engleheart) (votes, unanimous), from Miss Willmott, V.M.H., Warley Place, Great Warley, Essex. One of the finest Daffodils of the season. A bold-flowered *triandrus* hybrid, with large, straight, bright yellow trumpet, and ample, softer and paler yellow perianth segments.

To Daffodil 'Countess Visconti' (Engleheart) (votes, 9 for, 3 against), from Miss Willmott, V.M.H. Another *triandrus* hybrid, slightly smaller than the foregoing; perianth segments white; trumpet light yellow.

To Daffodil 'Valeria' (Engleheart) (votes, unanimous), from Miss Willmott, V.M.H. A beautiful *Burbidgei* variety, with broad, purest white perianth segments and a neat, deep yellow, orange-rimmed crown. It might be described as a glorified *N. poeticus poetarum.*

To Daffodil 'Occident' (Engleheart) (votes, unanimous), from Miss Willmott, V.M.H. A large *Barrii* variety, with a finely formed light sulphur-yellow perianth and a very bright orange cup.

To Daffodil 'Astrardente' (Engleheart) (votes, unanimous), from Miss Willmott, V.M.H. This is a large pure white variety of the *Burbidgei* class, but with an especially broad flat crown, orange-coloured, with a very bright orange-crimson rim.

To Daffodil 'Caroline Carver' (votes, 10 for, 1 against), from Miss Katherine Spurrell, Bessingham, Hanworth, Norwich. A very broad-crowned *Burbidgei* variety. The perianth is creamy-white, and the exquisitely frilled or pleated crown is yellow, margined with orange.

To *Tulipa Hageri* var. *nitens* (votes, unanimous), from Messrs. Wallace, Colchester. This is a charming little Tulip, growing about a foot high, and producing rather small flowers, which are, however, exceptionally brilliant when fully expanded. The inner surface is rich vermilion-scarlet, and shines as though burnished; the outer surface is dull buff. This variety is, for garden purposes, much finer than the true *T. Hageri*.

To Tulip 'La Rêve' (votes, unanimous), from Messrs. Cutbush, Highgate. A large-flowered variety with bluntly oval blooms, which are at once curiously and attractively coloured. On the outer surface of each broad segment is a spreading rosy-buff flame, reaching to the bright silvery-rose feathering at the margins. The inner surface of the flower is dull yellow. The stems are long and stout. 'Sarah Bernhardt' is the name under which the variety was originally submitted, and 'American Lac' is another title for the same Tulip.

Other Exhibits.

Miss Willmott, V.M.H., Great Warley, exhibited a group of new Daffodils, the flowers all bright, clean, well developed, and finely arranged.

G. H. Cammell, Esq., Brookfield Manor, Hathersage, Sheffield, sent Daffodil 'Moscar,' which the Committee desired to see again.

Narcissus and Tulip Committee, May 19, 1903.

Mr. H. B. May in the Chair, and thirteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Wallace, Colchester, for a tastefully arranged selection of May-flowering Tulips.

To Messrs. Bath, Wisbech, for a group of May-flowering Tulips and late Daffodils.

To Messrs. Barr, Covent Garden, for an extensive display of Tulips consisting chiefly of Darwin and Cottage varieties.

Silver Banksian Medal.

To Mr. W. B. Hartland, Patrick Street, Cork, for a group of Irish-grown Tulips. The flowers were all of large size, and, notwithstanding their long journey, were quite fresh and bright.

To Messrs. J. Veitch, Chelsea, for May-flowering Tulips.

To Messrs. Cuthbert, Southgate, Middlesex, for a group of Tulips.

Award of Merit.

To *Tulipa strangulata maculata* (votes, 6 for, 3 against), from Messrs. Barr, Covent Garden. A rather strong-growing form with undulated, acutely pointed leaves, and big, light yellow flowers, marked at the base with dark violet-purple.

To Tulip 'Zomerschoon' (votes, 6 for, 3 against), from Miss F. W. Currey, The Warren, Lismore, Ireland. A brilliant large-flowered variety with vivid pink colouring and some cream-coloured markings.

To Tulip ' Zulu ' (votes, 8 for), from Messrs. Barr. One of the very darkest of the Darwin Tulips, and a strong grower. Its globular flowers are entirely of a deep violet-black hue.

To Tulip ' May Queen ' (votes, 7 for), from Messrs. Barr. A showy rose-pink variety prettily feathered with rosy-violet; segments rounded, thick and fleshy, marked with violet at the base.

To Tulip ' The Fawn ' (votes, 7 for), from Messrs. Wallace, Colchester, and Messrs. Barr, Covent Garden. This is a very distinct new variety, with slightly elongated flowers of good form and substance. The colour is light fawn-pink, with light greenish-yellow shading along the centre of the outer surface of each segment.

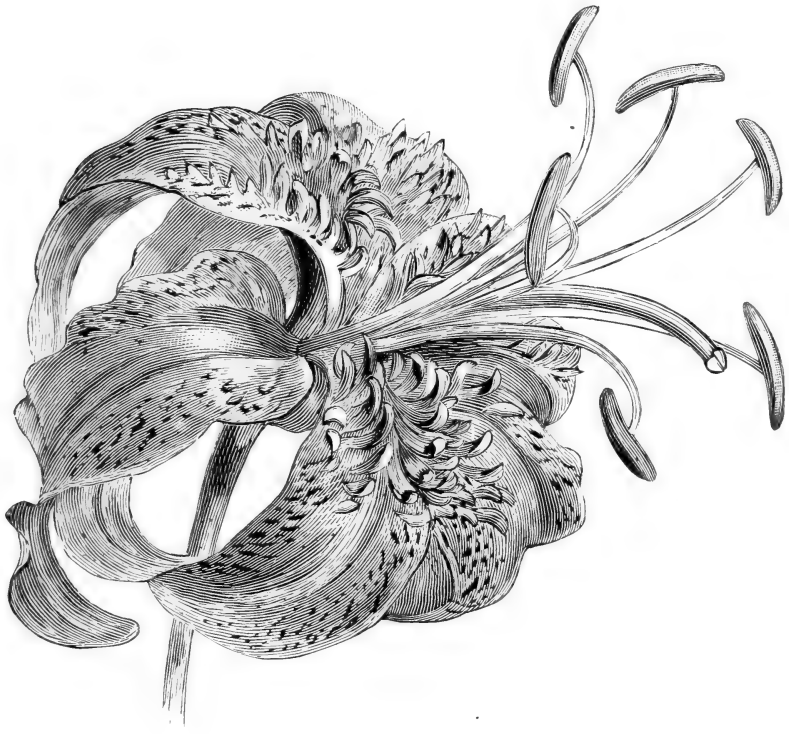
To Tulip ' Orange King ' (votes, unanimous), from Messrs. Wallace. In this variety the large blooms are of a clear and bright orange colour, with yellow base.

Other Exhibits.

Mr. Reuthe, Fox Hill, Keston, Kent, staged a small group of Tulips and late Daffodils.

Messrs. Bull, King's Road, Chelsea, exhibited a small group of May-flowering Tulips.

Messrs. Williams, Upper Holloway, exhibited a group of Tulips.



ELECTION AND PRIVILEGES OF FELLOWS AND TERMS OF SUBSCRIPTION.

Anyone interested in Horticulture is eligible for election as Fellow, and is invited to join the Society.

Candidates for election are proposed by two Fellows of the Society. Forms for proposing new Fellows may be obtained from the Office, 117 Victoria Street, Westminster. Ladies are eligible for election as Fellows of the Society.

A Fellow subscribing 4 guineas a year (or commuting) is entitled—

1.—To One Non-transferable (personal) Pass and Five Transferable Tickets admitting to all the Society's Exhibitions, and to the Gardens on any day except Sundays.

2.—To attend and vote at all Meetings of the Society.

3.—To the use of the Libraries at the Society's Rooms.

4.—To a copy of the Society's Journal, containing the Papers read at all Meetings and Conferences, Reports of trials made at Chiswick Gardens, and descriptions and illustrations of new or rare plants, &c.

5.—To purchase, at reduced rates, such fruit, &c., as is not required for the experimental purposes of the Society.

6.—To a share (in proportion to the annual subscription) of such plants as may be available for distribution. Fellows residing beyond a radius of 35 miles from London (by the A B C Railway Guide) are entitled to a double share.

7.—Subject to certain limitations, to obtain Analysis of Manures, Soils, &c., or advice on such subjects, by letter from the Society's Consulting Chemist, Dr. J. A. Voelcker, M.A.

8.—To have their Gardens inspected by the Society's Officer at the following fees:—One day, £2. 2*s.*; two days, £3. 3*s.*; *plus* all out of pocket expenses.

9.—To exhibit at all Shows and Meetings, and to send seeds, plants, &c., for trial to the Society's Gardens at Chiswick.

10.—To recommend any lady or gentleman for election as a Fellow of the Society.

A Fellow subscribing 2 guineas a year (or commuting) is entitled—

1.—To One Non-transferable Pass and Two Transferable Tickets.

2.—To the same privileges as mentioned in Nos, 2, 3, 4, 5, 6, 7, 8, 9, 10, as above.

A Fellow subscribing 1 guinea a year (or commuting) is entitled—

1.—To One Transferable Ticket (in lieu of the non-transferable Personal Pass), and the privileges mentioned in Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, as above.

N.B.—Each Transferable Ticket or Non-transferable personal Pass will admit three persons to the Gardens at Chiswick on any day *except* days on which an Exhibition or Meeting is being held, when each Ticket or Pass will admit One Person only. The Gardens are closed on Sundays.

An Associate subscribing 10s. 6d. a year is entitled—

1.—To One Non-transferable Pass, and to privileges as mentioned in Nos. 3, 4, and 9

N.B.—Associates must be *bonâ fide* Gardeners, or employees in a Nursery, Private or Market Garden, or Seed Establishment, and must be recommended for election by Two Fellows of the Society.

COMPOUNDING FOR SUBSCRIPTION.

Any Fellow wishing to commute his annual subscription may do so by making one payment of **Forty Guineas** in lieu of a £4. 4*s.* annual subscription; of **Twenty-five Guineas** in lieu of a £2. 2*s.* annual subscription; or of **Fifteen Guineas** in lieu of a £1. 1*s.* annual subscription; such commutation entitling the Fellow for life to all the privileges of the corresponding annual subscription.

Local Horticultural and Cottage Garden Societies may be Affiliated to the Royal Horticultural Society on application.

FELLOWS' PRIVILEGES OF CHEMICAL ANALYSIS.

(Applicable only to the case of those Fellows who are not engaged in any Horticultural Trade, or in the manufacture or sale of any substance sent for Analysis.)

The Council have fixed the following rates of charges for Chemical Analysis to Fellows of the Society being *bonâ fide* Gardeners or Amateurs.

These privileges are applicable only when the Analyses are for *bonâ fide* horticultural purposes, and are required by Fellows for their own use and guidance in respect of gardens or orchards in their own occupation.

The analyses are given on the understanding that they are required for the individual and sole benefit of the Fellow applying for them, and must not be used for the information of other persons, or for commercial purposes.

Gardeners, when forwarding samples, are required to state the name of the Fellow on whose behalf they apply.

The analyses and reports may not be communicated to either vendor or manufacturer, except in cases of dispute.

When applying for an analysis, Fellows must be very particular to quote the number in the following schedule under which they wish it to be made.

No.		
1.	An opinion on the purity of bone-dust (each sample)	2*s.* 6*d.*
2.	An analysis of sulphate or muriate of ammonia, or of nitrate of soda, together with an opinion as to whether it be worth the price charged	5*s.*
3.	An analysis of guano, showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts and ammonia, together with an opinion as to whether it be worth the price charged	10*s.*
4.	An analysis of mineral superphosphate of lime for soluble phosphates only, together with an opinion as to whether it be worth the price charged	5*s.*
5.	An analysis of superphosphate of lime, dissolved bones, &c., showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime and ammonia, together with an opinion as to whether it be worth the price charged	10*s.*
	An analysis of bone-dust, basic slag, or any other ordinary artificial manure, together with an opinion as to whether it be worth the price charged	10*s.*
7.	Determination of potash in potash salts, compound manures, &c.	7*s.* 6*d.*
8.	An analysis of compound artificial manures, animal products, refuse substances used for manure, &c.	from 10*s.* to £1
9.	An analysis of limestone, showing the proportion of lime	7*s.* 6*d.*
10.	Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	10*s.*
11.	Complete analysis of a soil	£3
12.	Analysis of any vegetable product	10*s.*
13.	Determination of the "hardness" of a sample of water before and after boiling	5*s.*
14.	Analysis of water of land-drainage, and of water used for irrigation	£1
15.	Analysis of water used for domestic purposes	£1 10*s.*
16.	Consultation by letter	5*s.*

Letters and samples (postage and carriage prepaid) should be addressed to the Consulting Chemist, Dr. J. Augustus Voelcker, 22 Tudor Street, New Bridge Street, London, E.C.

The fees for analysis must be sent to the Consulting Chemist at the time of application.

Instructions for selecting, drawing, and sending samples for analysis will be found on pages 26–33 of "Arrangements, 1903," or can be obtained on application to the Society's Office, 117 Victoria Street, S.W.

NOTICES TO FELLOWS.

OCTOBER 1903.

THE JOURNAL.

The Editor greatly regrets the delay which has occurred in the issue of the present number of the Society's Journal. It has been due to the immense increase of work which has been thrown upon him by the building of the New Hall in Vincent Square, Westminster, and the gift of the New Garden at Wisley in Surrey. The next number will be ready in February, and will contain all the Lectures delivered up to the end of the present year.

LETTERS.

All letters on *all* subjects should be addressed to The Secretary, R.H.S. Office, 117 Victoria Street, Westminster, S.W.

TELEGRAMS.

"**HORTENSIA, LONDON,**" is sufficient address for all telegrams.

THE NEW GARDEN AT WISLEY.

Fellows are naturally desirous of seeing the New Garden which Sir Thomas Hanbury has so generously given in trust for the Society's use, but they must be content to wait till the spring; for at present none of the Society's officers are there, and everything is in a transition state (see pages 214, 215, 216). It is hoped to be able to open the Garden to the Fellows in March, but due notice will be given in our next number.

THE NEW HALL IN VINCENT SQUARE.

The New Hall is rising fast from its foundations, and it is hoped that it may be ready for use in June of next year (see Commonplace Notes on pages 214, 215, 216). Vincent Square lies just behind the new Roman Catholic Cathedral recently built in Victoria Street, Westminster, and is only five minutes' walk from the present Drill Hall used for the Society's meetings.

JOURNALS WANTED.

The Secretary would be very greatly obliged for any of the following back numbers:—Vol. VII., Part 2; Vol. VIII.; Vol. X.; Vol. XIII., Part 1; Vol. XVI., Parts 2 and 3; Vol. XVII., Parts 1 and 2; Vol.

XVII., Parts 3 and 4; Vol. XIX., Part 1; Vol. XIX., Part 2; Vol. XX., Part 3; Vol. XXII., Part 3; Vol. XXII., Part 4; Vol. XXV., Part 3; Vol. XXVI., Part 4.

SUBSCRIPTIONS.

All Subscriptions fall due on January 1 of each year. To avoid the inconvenience of remembering this, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments (see page c); or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1. 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.

Several Fellows, in paying their Subscriptions, 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.

DISTRIBUTION OF PLANTS &c.

Fellows are particularly requested to note that a list to choose from of all the plants available for distribution is sent every year to every Fellow, enclosed *in the "Report of the Council,"* in the last week in January of each year. Owing to the removal of the plants to Wisley, the ballot for order of being served will this year be made in the middle of February and the distribution be proceeded with as quickly as possible. Fellows having omitted to fill up their application form before April 20 must be content to wait till the next distribution. The work of the Gardens cannot be disorganised by the sending out of plants at any later time in the year. All Fellows can participate in the Distribution *following* their election.

Plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

FELLOWS' PRIVILEGES OF CHEMICAL ANALYSIS &c.

Full instructions are contained in "Arrangements" for the current year, and an epitome thereof will be found on page ci of this volume.

NEW FELLOWS.

On March 4 next the Society completes its one hundredth year, and enters upon the second century of its existence. Before that eventful date arrives, will all the Fellows do their best to extend the usefulness of the Society by enlisting the sympathy of all their friends and persuading them to join the ranks of the Society? A list of the privileges

of Fellows will be found on page c, and just a line addressed to the Secretary, 117 Victoria Street, Westminster, containing the name and address of the proposed new Fellow, will suffice.

LECTURES &c.

Any Fellows willing to lecture in 1904 or to communicate Papers on interesting subjects are requested to communicate at once with the Secretary.

MEETINGS AND SHOWS.

1903 (remaining)—October 27; November 10, 24; December 15. **1904**—January 5, 26. All the above are at the Drill Hall, Buckingham Gate. The dates for 1904 will be announced in the book of *Arrangements*, 1904, which will be sent to all Fellows in January next.

A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Office, 117 Victoria Street, S.W., a sufficient number of halfpenny cards *ready addressed* to himself.

AFFILIATED SOCIETIES.

Secretaries of Affiliated Societies can now obtain on application a specimen copy of a new Card which the Council have prepared for the use of Affiliated Societies wishing to have a Card for Certificates, Commendations, &c. It can be used for Fruit or Flowers or Vegetables, and is printed in two colours—art shades of deep blue and green. Price 3*s.* 6*d.* for 10 copies, 5*s.* 6*d.* for 20, 11*s.* 6*d.* for 50, 20*s.* for 100.

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz., Bronze, 5*s.* 6*d.*, with case, complete; Silver, 12*s.* 6*d.*, with case, complete; Silver-gilt, 16*s.* 6*d.*, with case, complete.

TRIALS AT WISLEY, 1904.

Cauliflowers, Carrots, } ½ oz. of seed.
New Peas (edible), ½ pint of each.
New Potatos, 20 tubers of each.
New Cactus and Pompon Dahlias, 2 plants of each.
Tea and H.T. Roses, 2 plants of each.
Violas, 6 plants of each.

All the above (except Roses) should be sent before March 1, 1904, by Parcel Post, addressed:

Superintendent,
R.H.S. Gardens,
Wisley,
Ripley,
Surrey.

Anyone willing to send Roses should write beforehand for instructions as to how best to send them.

EXAMINATIONS.

1. The Society's Annual Examination in the Principles and Practice of Horticulture will be held on Wednesday, April 20, 1904. Candidates should send in their names not later than the 1st of March. Full particulars may be obtained by sending a stamped and directed envelope to the Society's offices. Copies of the Questions set from 1893 to 1902 (price 1*s*., or 5*s*. a dozen) may also be obtained from the office. The Society is willing to hold an examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

2. The Society will also hold an Examination in Cottage Gardening on Tuesday, June 21, 1904. This examination is intended for, and will be confined to, Elementary School Teachers. It has been undertaken in view of the increasing demand in country districts that the Schoolmaster shall be competent to teach the elements of Cottage Gardening, and the existing absence of any test whatever of such competence. The general conduct of this examination will be on similar lines to that of the more general examination.

FIG TREES FOR SALE.

In consequence of the removal of the Gardens to Wisley, it has been decided to dispose of some of the largest of the Pot Figs. Anyone wishing to secure them should apply to the Superintendent, R.H.S. Gardens, Chiswick, London, W.

ESSAY ON COTTAGE GARDENING.

The President and Council of the Royal Horticultural Society offer a prize of £10 for the best essay on Cottage and Allotment Gardening. The essay must not exceed 5,000 words, and all unnecessary technical expressions should be avoided. Notice must be taken of Vegetable, Fruit, and Flower cultivation. The essay must have as an appendix (not included in the 5,000 words) a list of reliable but inexpensive books on the subject, which could be recommended to a Cottager. The prize essay to become the sole and absolute property of the Society. The essays must reach the Secretary of the Society, 117 Victoria Street, Westminster, S.W., before January 1, 1904. Each essay must be signed with a motto, and a sealed envelope must be enclosed bearing the same motto on the outside and the writer's name and address inside. These envelopes will not be opened until the Judges shall have decided on the motto winning the prize. If any illustrations are added, they should be of the simplest and plainest outline description. The essay winning the prize will be subsequently published.

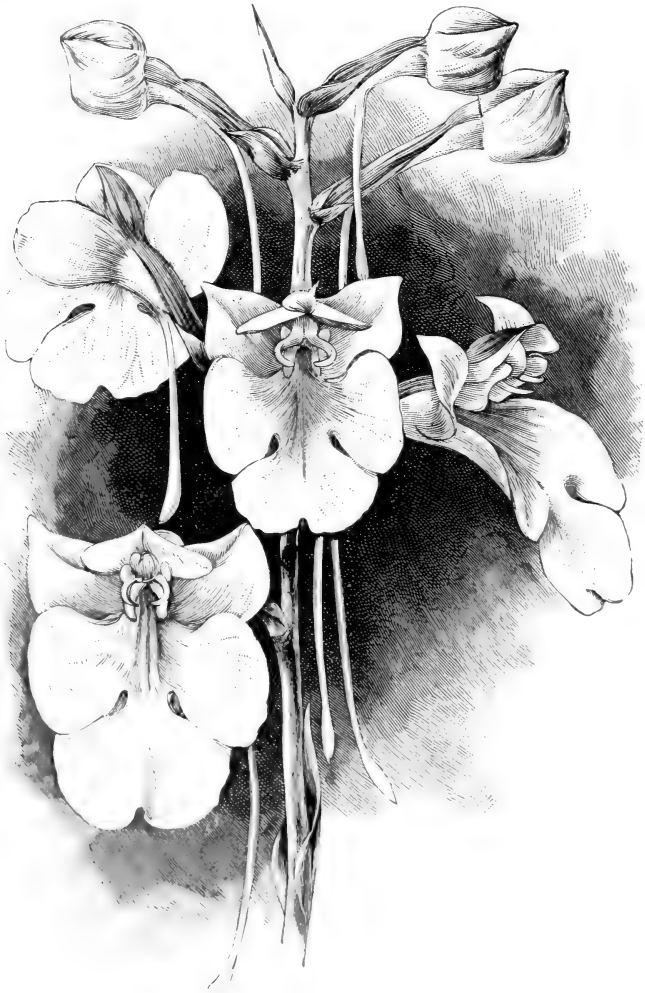
POPPY SEED.

The Secretary will be pleased to send a packet of his 1903 crop of Shirley Poppy Seed to any Fellows who like to send to Rev. W. Wilks, Shirley Vicarage, Croydon, a stamped envelope ready addressed to

themselves. The seed should be sown as early as possible in March. This is an offer made by the Secretary in his private capacity, and much inconvenience is caused when requests for seed are mixed up with letters &c. sent to the office in London instead of as above directed. For the last few years various newspapers have copied this notice, omitting the fact that the offer is made to Fellows of the Society only, and have thereby caused disappointment to many of their readers.

ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited. An Index to the Advertisements will be found on page 34.



EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

THE TEMPLE SHOW, 1903.

MAY 26, 27, AND 28.

JUDGES.

ORCHIDS.

H. J. Chapman
Jas. Douglas, V.M.H.
J. Gurney Fowler
H. Little

ROSES.

John Jennings
E. B. Lindsell
E. Mawley
Rev. J. H. Pemberton

FRUIT AND VEGETABLES.

T. Challis
W. Crump, V.M.H.
G. Norman, V.M.H.
A. H. Pearson

GROUPS IN OPEN AIR.

J. McLeod
H. B. May
C. E. Pearson
The late Jas. Smith, V.M.H.

HERBACEOUS, ROCK PLANTS, AND ALPINES.

E. Beckett
Rev. G. Engleheart, V.M.H.
Rev. F. Page-Roberts
Charles E. Shea

FOLIAGE PLANTS.

W. Bain
C. R. Fielder
J. Hudson, V.M.H.
R. Wilson Ker

FLOWERING PLANTS.

R. Dean, V.M.H.
E. Hill
W. Howe
G. Paul, V.M.H.

MISCELLANEOUS.

C. Dixon
E. Molyneux, V.M.H.
J. W. Odell
Peter Veitch

ADVISORY COMMITTEE.

James Hudson, V.M.H.
Henry B. May
The Lord Redesdale
Harry J. Veitch, F.L.S.
Arthur L. Wigan

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on the recommendation of the Fruit, Floral, and Orchid Committees will be found under their respective reports.

FIG. 163.—ROSE 'ENCHANTRESS.' (*The Garden.*)

Gold Medal.

Sir Frederick Wigan, Bart., for Orchids.

Messrs. Jas. Veitch & Sons, for trees, shrubs, flowering and foliage plants.

Messrs. Sander & Sons, for Orchids and stove plants.

Messrs. Wallace & Co., for Lilies and bulbous plants.

Messrs. G. Jackman & Co., for Clematis and hardy plants.

Messrs. Wm. Paul & Son, for Roses and Rhododendrons. (Fig. 163.)

Messrs. Fisher, Son, & Sibray, for ornamental trees and shrubs. (Fig. 164.)

Messrs. Blackmore & Langdon, for Begonias. (Figs. 165, 166.)
Messrs. Wm. Cutbush & Son, for Carnations and topiary work.
Messrs. H. Cannell & Sons, for vegetables, Cannas, Cacti, and Begonias.

Silver Cup.

Sir A. Henderson, Bart., M.P., for fruit.
Sir W. G. Pearce, Bart., for fruit.
W. H. James, Esq., for Carnations.
Martin Smith, Esq., for Carnations.
Messrs. Sutton, for fruit, vegetables, Gloxinias, Cinerarias, &c. (Fig. 167.)

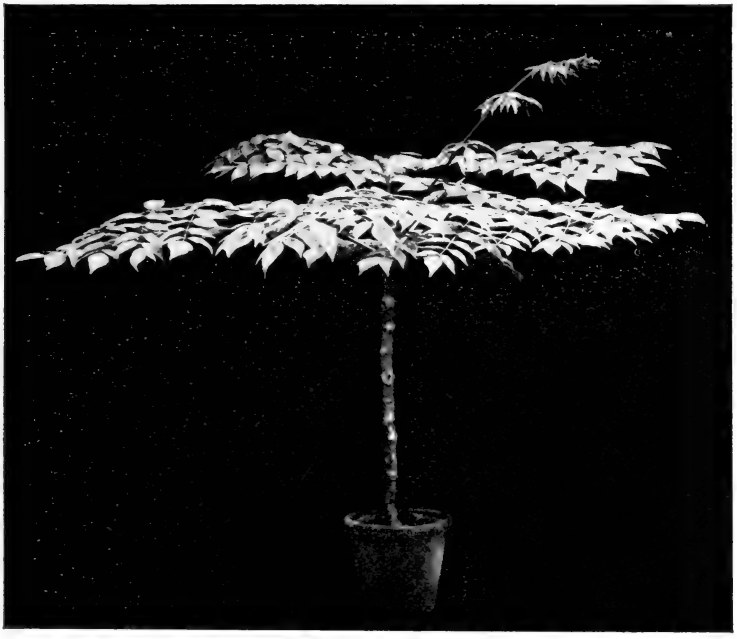


Fig. 164.—Dimorphanthus mandshuricus argenteo-marginatus. (*The Garden.*)

Messrs. Carter, for vegetables, Gloxinias, &c.
Guildford Hardy Plant Co., for herbaceous and Alpines.
Messrs. Backhouse, for Alpines.
Mr. John Russell, for Alocasias and trees and shrubs.
Messrs. Chas. Turner, for Roses and Pelargoniums.
Messrs. Geo. Paul & Son, for Roses and Alpines.
Mr. A. J. A. Bruce, for Sarracenias.
Messrs. Cuthbert, for Azaleas.
Messrs. John Waterer, for Rhododendrons.
Messrs. John Peed, for Caladiums, Begonias, and Gloxinias.
Messrs. Barr & Son, for herbaceous and Alpine plants.
Messrs. J. Cheal, for herbaceous and Alpine plants and shrubs.
Messrs. T. Cripps, for Acers and hardy trees and shrubs.

Mr. M. Prichard, for herbaceous and Alpine plants.
Mr. A. Perry, for hardy plants and aquatics.
Messrs. J. Hill & Son, for Ferns.
Messrs. Ware & Co., for Begonias and Alpines.

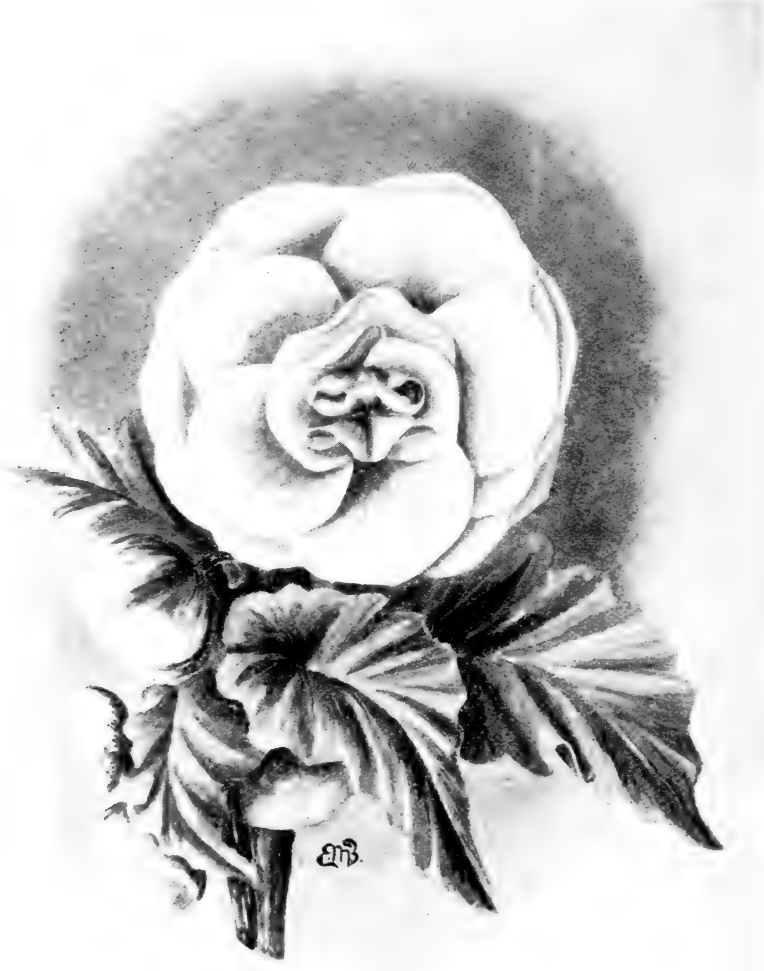


Fig. 165.—Double Begonia 'Hon. Lady Neeld.

Silver-gilt Lindley Medal.

J. Coleman, Esq., for Orchids.
Leopold Rothschild, Esq., for Orchids.
Messrs. Charlesworth, for Orchids.

Silver-gilt Hogg Medal.

Messrs. Geo. Bunyard, for fruit.
Messrs. Rivers & Son, for fruit trees.

Silver-gilt Flora Medal.

Lord Aldenham, for *Streptocarpus.*
Messrs. Reamsbottom, for Anemones.
Messrs. Bull, for Orchids and foliage plants.
Messrs. R. Smith, for Clematis, Roses, and herbaceous.

Fig. 166.—Double Begonia 'Mrs. Portman Dalton.'

Messrs. Balchin, for New Holland plants.
Messrs. Hugh Low, for Orchids.
Mr. Reuthe, for herbaceous and Alpines.
Messrs. Frank Cant, for Roses.
Messrs. Box, for Begonias.
Mr. B. R. Davis, for Begonias.

Messrs. Fromow, for Acers.
Messrs. Gilbert, for Anemones.

Silver Lindley Medal.

R. Ashworth, Esq., for Orchids.
Messrs. J. Cypher, for Orchids.

Silver Knightian Medal.

Mr. S. Mortimer, for vegetables.

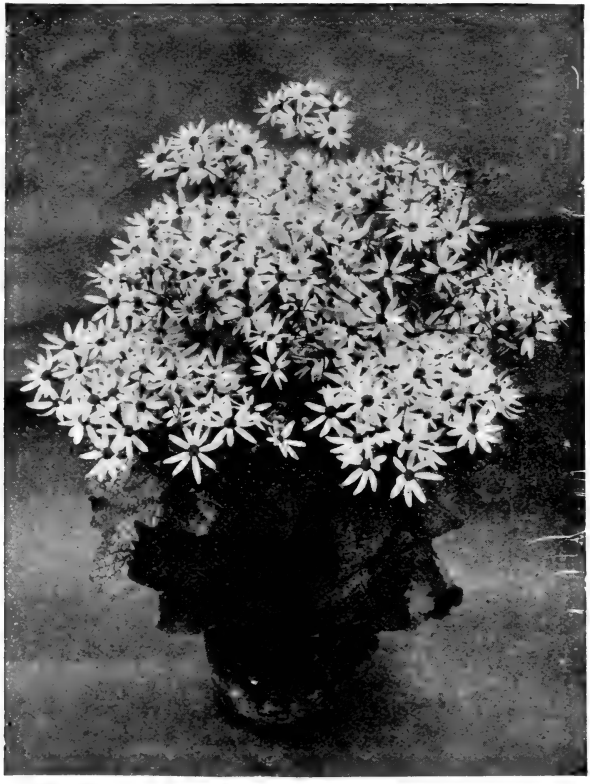


Fig. 167.—Cineraria stellata. (*The Garden.*)

Silver-gilt Banksian Medal.

J. Rutherford, Esq., M.P., for Orchids.
A. Wilson, Esq., for Carnations.
Messrs. Dobbie & Co., for Pansies and Violas.
Messrs. Alex. Dickson, for Tulips.
Mrs. T. Jannoch, for Lilies and Lilacs.
Mr. W. Iceton, for Lilies and foliage plants.
Messrs. B. Cant, for Roses.
Mr. Geo. Mount, for Roses.
Messrs. J. Laing, for Begonias and *Streptocarpus*.

Silver Banksian Medal.

A. C. Harmsworth, Esq., for Calceolarias.
A. D. Hall, Esq., for Tulips.
Messrs. Jones, for Sweet Peas.
Messrs. MacBean, for Orchids.
Mr. A. J. Harwood, for Asparagus.
Mr. W. Godfrey, for Asparagus.
Mr. H. C. Pulham, for Alpines.
Swanley Hort. Coll., for fruit and vegetables.
Messrs. Cowan, for Orchids.
Monsieur L. J. Draps-Dom, for Dracænas.
Mr. W. J. Godfrey, for Poppies.
Ranelagh Co., for *Asparagus myriocladus.*
Mr. R. Addie, for Mushrooms.
Mr. R. Anker, for Cacti.
Messrs. Gauntlett, for Rhododendrons.
Messrs. J. Kelway, for Pæonies.
Mr. W. H. Rogers, for hardy shrubs.
Mr. C. A. Watts, for Sweet Peas.

Silver Flora Medal.

T. A. Dorrien-Smith, Esq., for *Puya lanuginosa.*
R. J. Farrar, Esq., for Alpines.
Hon. A. A. Montmorency, for Tulips.
Messrs. Storrie, for Auriculas.
Messrs. Bath, for Carnations.
Messrs. H. B. May, for Pelargoniums and Ferns.
Messrs. Hobbies, for Roses and Carnations.
Mr. W. B. Child, for Violas and Alpines.
Miss Hopkins, for Alpines.
Mr. E. Lovett, for Alpines.
Messrs. B. S. Williams, for Orchids.
Mr. A. F. Dutton, for Carnations.
Mr. H. J. Jones, for Begonias and Pelargoniums.
Messrs. Laxton, for Strawberries.
Mr. J. Robson, for Orchids.
Mr. R. Sydenham, for Sweet Peas.
Messrs. Trower, for Lilies.
Messrs. Hogg & Robinson, for Tulips.

GENERAL MEETING.

JUNE 9, 1903.

Mr. F. G. LLOYD, J.P., in the Chair.

Fellows elected (129).—Thomas Adams, Mrs. Bailey Akroyd, Mrs. Arthur Aldous, Miss E. D. Arundell, E. P. Baily, Mrs. R. Barber, S. J. Batchelder, Miss Biddulph, Mrs. Bischoffsheim, Mrs. Blackburne, A. W. W. Bolton, J. Sidney Braithwaite, Harold Brassey, John S. Brierly, Charles E. Brown, R. W. B. Buckland, Rev. Herbert Bull,

M.A., J.P., T. G. Burden, A. E. Burgess, Mrs. Travers Buxton, J. T. Carr, Mrs. Malcolm Carter, Mrs. Cassel, W. Cocker, T. F. Conway, M. Corgialegno, Nunell Corte, Miss M. Cozens, D. Parry Crooke, J. C. Haworth Daniel, William Daniel, W. Ralph Dodd, F.I.C., F.C.S., Mrs. W. S. Durrant, Sir William Eden, Bart., W. Edgell, J. G. Eldering (Holland), Miss Logan Elmslie, Hon. Mrs. W. C. W. Fitzwilliam, Direktor Frauberger (Düsseldorf), Major Guy Freemantle, Mrs. Guy Freemantle, F. J. Fry, J.P., D.L., Dr. A. Gamack, H. E. Garford, Major-General A. C. Garrard, J. Gearey, O. Goldsmith, Mrs. C. E. Hadfield, Charles Hall, Miss Hampton, Miss L. S. Hannen, William Harris, John Harrison, Mrs. Brodie Henderson, Mrs. L. Hirsch, R. Hodgson, Mrs. Hoffmann, Commander A. F. Holmes, Mrs. Sancroft Holmes, J. H. Houldsworth, M. C. Hulbert, H. Huntley, W. Irving, T. Jackson, E. H. Johnson, S. E. Kennedy, Mrs. Stuart Knox, F. A. König, Mrs. Kortright, Robert Laidlaw, Sidney Lamert, Richard Lea, Lady Lilian Liddell, Maurice J. Lothian, John L. Lowe, Countess of Lucan, G. A. Macmillan, Miss E. A. Magill, John Mantell, G. R. Marsh, Mrs. J. C. Marshall, C. Hoskyns Master, Mrs. C. Hoskyns Master, A. G. Maxtone-Graham, Lady M. Rhoda Meyrick, Ernest Mocatta, L. Möller (Germany), W. A. Morgan, John Morton, jun., Earl of Munster, C. A. Scott-Murray, Major-General R. Owen Jones, C.B., R.E. Mrs. G. W. Palmer, Mrs. Passmore, J. Clift Penney, Miss R. E. Peyman, Miss E. M. B. Powell, Mrs. G. H. Radford, W. W. Richmond-Powell, H. W. Roach, C. Roozen (Holland), W. F. Roper, Mrs. W. Rudge, Mrs. R. A. Scott, Mrs. Scrimgeour, Mrs. T. J. Simpson, Mrs. Simpson, F. C. Stoop, Mrs. Storey, H. F. Strickland (India), H. Suzuki (Japan), W. Swoboda (Berlin), F. W. Theale, Mrs. Cutris Thomson, C. Threlfall, Mrs. M. Tweedie, C. J. L. Van der Meer (Holland), R. V. Van Zanten (Holland), Mrs. H. Vernet, Godfrey Walter, Sidney M. Ward, N. B. Warner-Bromley, Sir Algernon West, K.C.B., Miss L. Wickham, Mrs. G. W. Williams, Mrs. Trevor Williams, Mrs. Wood, Mrs. B. Woodward, Lady Young.

Associates (3).—A. Brook, D. Finlayson, F.L.S., J. Moore.

A lecture on "Fruit-Bottling" was given by Miss E. Bradley. (See p. 101.)

HOLLAND HOUSE SHOW, 1903.

JUNE 24 and 26.

JUDGES OF THE ROSES.

Classes **1, 2, 3.**

F. Cant.
A. Dickson.
A. Turner.

Classes **4 8.**

E. B. Lindsell.
E. Mawley.
J. H. Salter.

Classes **5, 6, 7.**

R. Harkness.
A. E. Prince.

Classes **9B, 10.**

J. Burrell.
O. G. Orpen.
A. Tate.

Class **9.**

Rev. F. R. Burnside.
W. F. Cooling.
G. Paul, V.M.H.

Classes **14, 16.**

W. J. Jefferies.
Rev. F. Page-Roberts.

Classes **11, 12, 13.**

J. Bateman.
Rev. A. Foster-Melliar.

Classes **15, 17.**

Mrs. Mawley.
Miss Philbrick.
Miss Willmott, V.M.H.

The same Exhibitor might only enter in one Class in each of the following Combinations : 1, 2 ; 5, 6.

Mixed Varieties.

Class **1.**—24 single blooms, distinct. *Amateurs.*
First Prize, Silver Cup ; Second, £3.
1. Mrs. Haywood, Reigate (gr. Mr. C. J. Salter).
2. A. Hill Gray, Esq., Newbridge, Bath.

Class **2.**—12 single blooms, distinct. *Amateurs.*
First Prize, Silver Cup ; Second £1. 10*s.*
1. O. G. Orpen, Esq., Colchester.
2. T. B. Gabriel, Esq., Woking.

Class **3.**—6 single blooms of any one variety of H.P., H.T., or H.B. *Amateurs.*
First Prize, Silver-gilt Banksian Medal and £1 ; Second, £1.
1. C. Lamplough, Esq., Chatteris, Cambs.
2. O. G. Orpen, Esq., Colchester.

Class **4.**—48 single blooms, distinct. *Open.*
First Prize, Silver Cup ; Second, Silver-gilt Flora Medal.
1. Frank Cant & Co., Braiswick Nursery, Colchester.
2. D. Prior & Sons, Colchester.

Teas and Noisettes.

Class **5.**—18 single blooms, not less than 12 varieties or more than 2 trusses of any one variety. *Amateurs.*
First Prize, Silver Cup ; Second, £2.
1. A. Hill Gray, Esq., Bath.
2. O. G. Orpen, Esq., Colchester.

Class **6.**—12 single blooms, not less than 9 varieties or more than 2 trusses of any one variety. *Amateurs.*
First Prize, Silver Cup ; Second, £1. 10*s.*
1. T. B. Gabriel, Esq., Woking.

Class **7.**—6 single blooms of any one variety. *Amateurs.*
First Prize, Silver-gilt Banksian Medal and £1 ; Second, £1.
1. O. G. Orpen, Esq., Colchester.
2. Rev. F. R. Burnside, Gt. Stambridge, Essex.

Class **8.**—18 single blooms, distinct. *Open.*
First Prize, Silver Cup ; Second, Silver-gilt Banksian Medal.
1. Messrs. D. Prior & Sons, Colchester.
2. G. Prince, Longworth, Berks.

Other Roses.

Class **9.**—18 bunches in not less than 12 varieties (consisting of not less than 5 trusses of each) of Garden Roses, distinct, including China, Moss, Polyantha, Provence, and other summer-flowering Roses and their hybrids, and all those mentioned in the National Rose Society's "Catalogue of Garden Roses," and also all Teas and Noisettes not included in the National Rose Society's "List of Exhibition Roses"; *all Singles, however, excluded.* To be staged in 18 glasses or jars not exceeding 3 inches diameter at the top; all stems to reach the water; each variety in a separate glass or jar. *Amateurs.*

First Prize, Silver Cup; Second, £2.

1. O. G. Orpen, Esq., Colchester.

Class **9b.**—36 bunches (consisting of not less than 5 trusses of each) of Garden Roses, distinct, including China, Moss, Polyantha, Provence, and other summer-flowering Roses and their hybrids, and all those mentioned in the National Rose Society's "Catalogue of Garden Roses," and also all Teas and Noisettes not included in the National Rose Society's "List of Exhibition Roses;" *all Singles, however, excluded.* To be staged in 36 glasses or jars not exceeding 3 inches diameter at the top; all stems to reach the water; each variety in a separate glass or jar. *Open.*

First Prize, Silver Cup; Second, Silver-gilt Flora Medal;
Third, Silver Flora Medal.

1. Frank Cant & Co., Colchester.
2. B. R. Cant & Sons, The Old Rose Gardens, Colchester.
3. G. Cooling & Sons, 11 Northgate St., Bath.

Class **10.**—12 bunches in not less than 9 varieties (consisting of not less than 5 trusses of each) of Rugosa and Bourbon varieties and their hybrids. To be staged in nine glasses or jars not exceeding 3 inches diameter at the top; all stems to reach the water; each variety in a separate glass or jar. *Open.*

First Prize, Silver-gilt Flora Medal; Second, Silver Flora Medal;
Third, Bronze Flora Medal.

1. Paul & Son, Cheshunt.
2. Frank Cant & Co., Colchester.
3. G. Cooling & Sons, Bath.

Class **11.**—12 bunches (consisting of not less than 5 trusses of each) of Single Roses and Sweet Briar varieties and their hybrids, distinct. To be staged in 12 glasses or jars not exceeding 3 inches diameter at the top; all stems to reach the water; each variety in a separate glass or jar. Single Roses have only one row of petals. *Open.*

First Prize, Silver-gilt Flora Medal; Second, Silver Flora Medal;
Third, Bronze Flora Medal.

1. B. R. Cant & Sons, Colchester.
2. Frank Cant & Co., Colchester.
3. G. Cooling & Sons.

Class **12.**—9 bunches (consisting of not less than 5 trusses of each) of Chinas and their hybrids, distinct. To be staged in 9 glasses or jars

not exceeding 3 inches diameter at the top; all stems to reach the water; each variety in a separate glass or jar. *Open.*

First Prize, Silver-gilt Flora Medal; Second, Silver Flora Medal.

1. Frank Cant & Co., Colchester.

Class **13.**—12 bunches (consisting of not less than 5 trusses of each, not disbudded) of Hybrid Teas according to National Rose Society's list, distinct. To be staged in 12 glasses or jars not exceeding 3 inches diameter at the top; all stems to reach the water; each variety in a separate glass or jar. *Open.*

First Prize, Silver Cup; Second, Silver Flora Medal.

No awards.

Class **14.**—New Roses of any Class not yet put into commerce; not less than 3 blooms or trusses of each. *Open.* Medals or Certificates according to merit.

No awards.

Class **15.**—A bowl or vase of Roses arranged for effect. Rose foliage only to be used. Wire supports allowed, but the less they are in evidence the greater the merit of the arrangement. *Amateurs.*

Frist Prize, £2; Second, £1. 10*s.*; Third, £1.

1. Miss B. H. Langton, Raymead, Hendon.
2. O. G. Orpen, Esq., Colchester.
3. F. G. Oliver, Esq., 97 Tollington Park, N.

Class **16.**—A representative group of Roses placed on the ground (inverted pots, &c., may be used as usual for elevating separate plants) in a space not exceeding 200 square feet, including as far as possible H.P.'s, Teas, Noisettes, H.T.'s, Bourbons, Chinas, Garden, Climbing, and Moss Roses, species and hybrids, in pots, or cut flowers in plain glasses, vases or jars, and not in exhibition boxes. The foliage used with cut blooms must be that of the variety itself and no other, but ferns, palms, grasses, &c., in pots, may be used as edging and background. *Open.*

First Prize, R.H.S. Gold Medal; Second, Silver Cup;
Third, Silver-gilt Flora Medal.

1. Chas. Turner, Slough.
2. Paul & Son, Cheshunt.
3. Mr. G. Mount, Canterbury.

Class **17.**—24 Climbing or Pillar Roses in bloom in not less than 12 varieties, or more than 2 plants of any one variety; exhibited in pots to show character and habit. *Open.*

First Prize, Silver Cup; Second, Silver-gilt Flora Medal.

No competition.

JUDGES OF PLANTS OTHER THAN ROSES.

Orchids.	Fruit and Vegetables.
H. J. Chapman.	T. Challis.
Jas. Douglas, V.M.H.	W. Crump, V.M.H.
J. Gurney Fowler.	A. H. Pearson.
H. Little.	

GROUPS IN OPEN AIR.

John Jennings.
J. McLeod.
The late Jas. Smith, V.M.H.

HERBACEOUS, ROCK PLANTS, AND ALPINES.

W. H. Divers.
C. E. Pearson.
Chas. E. Shea.

FOLIAGE PLANTS.

W. Bain.
C. R. Fielder.
R. Wilson Ker.

FLOWERING PLANTS.

W. Bates.
R. Dean, V.M.H.
E. Hill.
W. Howe.

MISCELLANEOUS.

C. Dixon.
E. Molyneux, V.M.H.
J. W. Odell.
Owen Thomas, V.M.H.

IMPLEMENTS, &c.

E. Beckett.
J. Hudson, V.M.H.
G. Norman, V.M.H.
G. Wythes, V.M.H.

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on the recommendation of the Fruit, Floral, and Orchid Committees will be found under their respective reports.

Gold Medal.

To Lord Aldenham (gr. Mr. Beckett), Elstree, for Crotons and shrubs.
To Messrs. Jas. Veitch, for stove and greenhouse plants, Conifers, &c.
To Mr. John Russell, for stove and greenhouse plants and Ivies.
To Messrs. Sander, St. Albans, for Orchids and new and rare plants.
To Messrs. Rivers, Sawbridgeworth, for fruit trees in pots.
To Messrs. Cutbush, for Carnations, flowering plants, and clipped trees.
To Messrs. Bull, Chelsea, for cut flowers.

Silver Cup.

To J. Colman, Esq., Reigate, for Orchids.
To Leopold de Rothschild, Esq., Gunnersbury House, Acton, for fruit.
To Messrs. Blackmore & Langdon, Twerton Hill, Bath, for Begonias.
To Messrs. Wallace, Colchester, for hardy and bulbous plants.
To Messrs. Hobbies, Dereham, for Roses, Carnations, Violas, &c.
To Mr. H. B. May, Upper Edmonton, for Ferns and foliage plants.
To Messrs. Ware, Feltham, for herbaceous and Alpine plants.
To Messrs. Peed, Norwood, for Sweet Peas, Gloxinias, and Caladiums.
To Messrs. Cannell, Swanley, for Cannas and Aquilegias.
To Messrs. Carter, Holborn, for Gloxinias, Pigmy trees, &c.
To Mr. Perry, Winchmore Hill, for hardy cut flowers and aquatics.
To Messrs. Hugh Low, Enfield, for Orchids.
To Messrs. Dobbie, Rothesay, for Violas, Pansies, and Pelargoniums.
To Messrs. Hill, Lower Edmonton, for Ferns.

To Messrs. Charlesworth, Heaton, Bradford, for Orchids.
To Messrs. Cripps, Tunbridge Wells, for hardy trees and shrubs.

Silver-gilt Flora Medal.

To Mr. Geo. Mount, Canterbury, for Roses.
To Messrs. Barr, Covent Garden, for hardy flowers, &c.
To Messrs. Cheal, Crawley, for hardy shrubs and trees.
To Messrs. Davis, Yeovil, for Begonias.
To Messrs. Jones, Shrewsbury, for Sweet Peas, Irises, &c.
To Messrs. Paul & Son, Cheshunt, for Roses.
To Messrs. Laing, Forest Hill, for Begonias and Caladiums.
To Messrs. Waterer, Bagshot, for Kalmias and Rhododendrons.
To Mr. Forbes, Hawick, for Phloxes and Pentstemons.
To Messrs. Jackman, Woking, for hardy flowers.

Silver-gilt Banksian Medal.

To Messrs. Kelway, for Delphiniums, Pæonies, &c.
To Mr. W. B. Child, Birmingham, for hardy flowers.
To Mr. Prichard, Christchurch, for hardy flowers.
To Messrs. Cuthbert, Southgate, for flowering plants.
To Mr. Anker, Kensington, for cactaceous plants.
To Messrs. Fromow, Chiswick, for Japanese Maples and shrubs.
To Mr. Notcutt, Woodbridge, for hardy flowers.

Silver Flora Medal.

To the Rt. Hon. the Earl of Ilchester, Kensington, for succulents.
To Messrs. Bunyard, Maidstone, for hardy flowers.
To Mr. Iceton, Putney, for Lily of the Valley, &c.
To the Ranelagh Nursery Co., Leamington Spa, for foliage plants.
To Mr. Reuthe, Keston, for hardy flowers.
To Messrs. Storrie & Storrie, Dundee, for Iceland Poppies.
To Mr. G. Prince, Longworth, Berks, for Roses.

Silver Banksian Medal.

To Baron Rothschild, Vienna, for Pineapples.
To Mr. J. R. Box, West Wickham, for Alpine and rock plants.
To Mr. A. Dutton, Bexley Heath, for Carnations.
To Mr. V. Slade, Taunton, for cut Pelargoniums.
To the Misses Hopkins, Mere, Knutsford, for hardy flowers.
To Mr. R. Sydenham, Birmingham, for Sweet Peas.
To Messrs. Williams, Holloway, for Orchids and hardy flowers.
To Mr. Turner, Slough, for Pinks.

Cultural Commendation.

To the Rt. Hon. the Countess of Portsmouth, Whitchurch, Hants, for Cherries.

IMPLEMENTS.

Silver Flora Medal.

Messrs. Pulham, Newman Street, W., for stone vases, &c.
Messrs. Green, Queen Victoria Street, E.C., for glass vases.
Messrs. Champion, 115 City Road, E.C., for tubs for trees, &c.

Silver Knightian Medal.

Messrs. Wood, Wood Green, London, for sundries.
Messrs. Osman, 132 Commercial Street, E., for sundries.

Silver Banksian Medal.

Mr. Riley, Herne Hill, S.E., for summer-houses.
Mr. Jas. George, Putney, S.W., for sundries.
Messrs. Dowel, Hammersmith, for pottery, &c.
Messrs. Herbert, Hop Exchange Warehouse, S.E., for sundries.
Mr. Pinches, Crown Street, Camberwell, for labels.
The Standard Co., Derby, for pruners, &c.
Messrs. Ohlendorf, Leadenhall Street, E.C., for manures.

GENERAL MEETING.

July 7, 1903.

Mr. George Bunyard, V.M.H., in the Chair.

Fellows elected (108).—John Andrews, F. H. V. Anson, Mrs. Ardern, Colonel Hanbury Barclay, Miss E. M. Barlow, Gilbert Beale, G. H. Beckhuson, Mrs. E. Bellamy, O. D. Belsham, J.P., Mrs. R. Bennett, the Lady Elizabeth Biddulph, Arthur Bird, E. W. E. Blandford, Lady Blois, Mrs. E. H. Bousfield, Mrs. Cecil Braithwaite, L. C. Brooke, Mrs. E. W. Brooks, Mrs. Hawksley Burbury, T. Burch, Captain J. W. Burns, J. S. Burra, Abel Camacho, Sir Guy Campbell, Bart., Mrs. Cave-Brown-Cave, Brodrick Cloeté, Miss M. Coles, F. Colsell, Miss M. S. Cope, T. J. Cross, the Countess of Darnley, Andrew Devitt, Mrs. Downes, Mrs. E. M. Du Buisson, Mrs. R. Dunthorne, A. F. Dutton, R. G. Edwards, James Epps, Jr., Mrs. G. Farquhar, John Fisher, Charles Foster, Captain F. Williams Freeman, R.N., Mrs. S. Fremantle, M. W. Galloway, C. Echlin Gerahty, Geraldine, Lady Glyn, Allan L. Goadly, John Gould Mrs. C. F. Greenhill, S. Greenop, John Hargreaves, G. T. N. Harrison, Miss A. V. Henderson, Mrs. Horsford, Sir Arthur Hort, Bart, M.A., F. Houghton, J. P. Houghton, F.S.I., G. J. Ingram, Thomas Jesson, J. N. Johnson, Miss Stanhope Jones, Hon. Mrs. Ker, Mrs. A. Kitson, C. S. Laurence, Mrs. John Lees, Reginald Longley, Mrs. Edgar Lubbock, John McConnell, Mrs. E. Martelli, Thomas Martin, the Viscountess Melville, Mrs. Mildred, Mrs. Mitchell, Mrs. Mitton, Samuel Murray, Lord Newlands, R. Q. O'Flanagan, Mrs. H. Palmer, Lady Phillimore, Stephen Phillimore, F. S. Phillips, Miss Plowman, Mrs. S. P. Pope, Tresilian Reid-path, Mrs. G. Samuelson, Mrs. W. Scrimgeour, Mrs. H. Smith, Mrs. Roland Soames, Lady Southwell, Mrs. J. Trevor Spencer, E. F. Stearns, Duncan Stewart, A. W. Stirling, T. D. Syers, Mrs. R. F. Synge, E. F. Thorpe, H. G. Turner, Mrs. A. A. Van den Driesche, Edward Wagg, W. Wallace, the Duchess of Wellington, W. P. Westell, Stephen White, Mrs. S. F. Whitlaw, Cyril Wintle, J. G. Wood, Miss L. M. Woodcock, Miss Yate-Lee.

Society affiliated (1).—Hurst Horticultural and Cottage Garden Society.

Lectures on "Hardy Irises" were given by Miss Armitage and Mr. Carparne. (See pp. 451 and 458.)

GENERAL MEETING.

July 21, 1903.

Mr. A. H. Pearson in the Chair.

Fellows elected (35).—Mrs. Alder, Charles Armstrong, Mrs. J. Bagot, Miss B. M. Berkley, Miss K. Biggs, Mrs. Blaauw, Dr. C. S. Bowker, A. Bromet, Dr. Burtt, Mrs. L. Cameron, Lady Margaret Cecil, William Dormer, T. H. Down, G. Edwards, F. Hawyard, Lady Arthur Hill, C. Napier Jackson, Mrs. W. Jackson, Mrs. W. F. Knight, Sir Philip Magnus, José M. de Mancha, F. E. Mugford, H. W. Page, Mrs. E. de la Penha, Hon. Gerald Ponsonby, W. Shrives, H. C. Swayne, Mrs. H. P. Tricou (U.S.A.), Henry Vallance, Mrs. Henry Vallance, Mrs. H. Vyse, J. H. Wagstaff, W. W. Ward, Mrs. W. Welsby, G. Kyme Wright.

Society affiliated (1).—Stroud Horticultural Society.

A lecture on "Horticulture in New Zealand" was given by Mr. G. Hunt. (See p. 146.)

DEPUTATION TO CARDIFF.

July 22, 1903.

At the invitation of the President, Chairman, and Executive Committee of the Cardiff and County Horticultural Society, the Council appointed the following gentlemen to act as a Deputation to visit the Cardiff Horticultural Show:

The Rt. Hon. the Earl of Ilchester, Member of Council.
Frederick G. Lloyd, Esq. J.P., Member of Council.
James H. Veitch, Esq., F.L.S.
Arthur L. Wigan, Esq., Member of Council.
Rev. W. Wilks, M.A., Secretary R.H.S.
Mr. S. T. Wright, Superintendent of the Society's Gardens.

The Deputation left Paddington at 3.35 on Tuesday, July 21, and arrived at Cardiff at 6.30, being welcomed at the station by the Chairman of the Local Society, Dr. de Vere Hunt, and several other members of the Executive Committee, who conducted them to their hotel and entertained them most courteously at dinner.

On the following morning the Deputation were conducted over Cardiff Castle, the Marquis of Bute having most kindly ordered the private apartments to be shown them. The Castle is a wonderful specimen of Early English architecture and has been restored and re-decorated in Early English style, and should be visited by anyone who ever happens to be in the neighbourhood.

From the Castle the Deputation went on to the Flower Show, held in the beautiful park-like gardens adjoining the Castle and generally thrown open to the public by the Marquis. After making the awards and carefully

inspecting all the exhibits, the Deputation was entertained at luncheon under the presidency of his Worship the Mayor.

After luncheon the Deputation's duties were ended, and some returned back to London at once, others going on further into Wales, but all alike brought away enduring remembrance of the genial kindness and abundant hospitality of their gardening friends at Cardiff.

Awards made at Cardiff.

Gold Medal.

To the Marquis of Bute, Cardiff Castle, for a group of stove and greenhouse plants (gr. H. Farmer).

To Mr. James Watson, of Cardiff, for a general collection of Cacti.

To Messrs. Hill & Son, Edmonton, for a collection of Ferns.

Silver-gilt Flora Medal.

To Messrs. Blackmore & Langdon, Bath, for Begonias.

To Messrs. Cypher, Cheltenham, for a group of plants for effect.

Silver Flora Medal.

To J. Buckley, Esq., of Llanelly, for a group of plants for effect.

To Messrs. Russell, Richmond, for a group of ornamental shrubs.

To Mr. W. Treseder, of Truro, for a collection of herbaceous flowers.

To the Kingsacre Nursery Co., Hereford, for Roses.

To Messrs. B. R. Davis, of Yeovil, for Begonias.

Silver Knightian Medal.

To the Marquis of Bute, for Grapes in pots (gr. H. Farmer).

To Lord Aldenham, Elstree, for vegetables (gr. E. Beckett).

To Sir A. Henderson, Bart., Faringdon, for vegetables (gr. W. Bastin).

Silver Banksian Medal.

To J. Howells, Esq., J.P., Cardiff, for Ferns (gr. A. Brown).

To Mr. John Crossling, of Penarth, for Roses.

To Messrs. Barr, Covent Garden, London, for hardy flowers.

To Mr. M. Prichard, Christchurch, for hardy flowers.

To Messrs. John Waterer, of Bagshot, for trees and shrubs.

Bronze Flora Medal.

To Messrs. Stokes, of Trowbridge, for hardy flowers.

Bronze Banksian Medal.

To Sir T. Morel, of Penarth, for Sweet Peas.

To Messrs. Jarman, of Chard, for Sweet Peas.

To Mr. J. W. Mellings, of Penylan, Cardiff, for flowering plants.

To Mr. J. E. Deacon, of Bridgend, for vegetables.

To Mr. F. Mears, of Dynas Powis, for vegetables.

Special Commendation.

To J. N. Leigh, Esq., for Begonias.

To A. W. Morris, Esq., for a bowl of Roses.

To Mr. A. Redwood, for vegetables.

To Mrs. E. Tiplin, for wild flowers.
To Mr. W. J. Mellings, for Pelargoniums.
To Mr. C. Howe, for a Pelargonium.
To Mrs. Jenner, for Sweet Peas.
To Mr. Adey, for Sweet Peas.
To Mr. W. Treseder, for a bouquet.

GENERAL MEETING.

August 4, 1903.

Mr. Joseph Cheal in the Chair.

Fellows elected (23).—Peter Adam, C. W. Breadmore, C. G. Butler, George Carter (Natal), Mrs. Cazalet, J. H. Craven, D. Drummond, Sir Josslyn Gore-Booth, Bart., J. G. Hall, J. E. Hall, Mrs. H. O. Ingham, Major-General H. H. Lee, J. May, Mrs. Anne Murray, Colonel the Hon. G. Napier, Miss E. P. Nickalls, A. Nockolds, A. A. Peeters (Brussels), Major P. Petre, Mrs. Vernon Smith, B. G. Van Heyst (Holland), J. Collard Vickery, Miss Rebecca A. Williams.

Societies affiliated (2).—Devon Daffodil and Spring Flower Society, Malta Horticultural Society.

GENERAL MEETING.

August 18, 1903.

Mr. George Gordon, V.M.H., in the Chair.

Fellows elected (23).—R. W. Barber, A. G. Barley, H. F. Birch-Reynardson, Mrs. Maunsell Bradhurst, T. W. Brown, A. Clarke (Australia), H. Collins, Clement Dalley, Miss A. C. Greathed, Barclay Hector (New Zealand), Dr. A. Henry, M.A., F.L.S., Mrs. W. P. Herringham, the Rt. Hon. Sir Francis Jeune, G.C.B., Mrs. H. Stanhope Rawson, Charles Sanger, Miss B. Shadwell, Colonel T. H. Skinner, W. Somerville, D.Œc., C. Stuart-Wade, J.P., J. J. Swaffield, Rev. J. H. Townsend, Mrs. C. W. Soper Whitburn, Mrs. Younger.

Associate (1).—Thomas Burrows.

Society affiliated (1).—Warkworth Floral and Horticultural Society.

A paper on "Hollyhocks," by Mr. George Webb, was read by the Secretary. (See p. 398.)

GENERAL MEETING.

September 1, 1903.

Mr. Edward Mawley, F.R. Met. Soc., in the Chair.

Fellows elected (22).—G. H. Maxwell Batten, Mrs. W. T. Crosweller, H. C. B. Cunyngham, James Dawes, Miss Dunlop, E. T. Edwards, Mrs. Gough, Lady Macpherson Grant, Charles Howie (Transvaal), J. E.

Hulbert, Mrs. E. Warton Johnson, T. Hermann Lowinsky, N. H. Martin, F.L.S., Frank Murton, Hugh L. Norris, Mrs. F. J. Roberts, Miss May Shears, E. A. Strauss, Mrs. H. A. Thompson, F. Townsend, W. James Wingfield, Mrs. Percy Woods.

A lecture on "Judging Cactus Dahlias" was given by Mr. C. G. Wyatt. (See p. 338.)

GENERAL MEETING.

SEPTEMBER 15, 1903.

Mr. JAMES L. WOOD in the Chair.

Fellows elected (24).—Leo Allen, Robert Burra, Mrs. Louis Chanler, Edwin Coker, Mrs. G. H. Day, G. Barker Godfrey, E. C. Horrell, Mrs. James, Mrs. W. Milburn, jun., Mrs. Ouchterlony, John Palmer, Colonel M. C. Perreau, Miss S. G. Power, T. Rowland, C. F. Rowsell, Mrs. Ruddin, Rev. Dr. Short, C. H. Smithson, Mrs. Lee Steere, Stanley V. Symondson, G. P. Walker, Edward Walpole, A. P. White, Miss Wren.

EXHIBITION OF EDIBLE FUNGI.

SEPTEMBER 15, 1903.

AN Educational Exhibition of Edible Fungi was held this day, and a lecture upon them, illustrated with magnificent coloured diagrams of all the edible British species of any practical use, was given by Dr. M. C. Cooke, M.A., V.M.H. (See p. 495.) All interested in extending or acquiring the knowledge of the edible species were invited to send collections of any fungi supposed to be edible. Each specimen was directed to be wrapped separately in thin or tissue paper, and packed so as not to get loose or shaken in transit. If the names were known to the senders they were requested to write them neatly on cards, but if not known they were as far as possible named by the experts. The Society paid the carriage of all collections, and awarded medals according to merit. The best collection was considered to be that which included the largest number of edible species shown in the best condition. When the senders were doubtful as to whether any of the specimens were edible or not, the matter was determined by the experts. Unnamed collections were also examined, named, and sorted into edible and poisonous by the experts as far as time permitted.

In addition to Dr. Cooke, V.M.H., and Mr. George Massee, V.M.H., we were able to secure the services of two most efficient provincial mycologists in the persons of Mr. Charles Crossland, F.L.S., of Coleridge Street, Halifax, and Mr. A. Clarke of St. Andrew's Road, Huddersfield, both of them active members of the Yorkshire Naturalists' Union, who did excellent service during the day in naming and arranging the specimens.

It was rather astonishing to find that not one single specimen of the common Mushroom was sent, nor did anyone send examples of the

ordinary cultivated Mushroom, which it might have been imagined some of the cultivators of Mushrooms would have been sure to send. It was very remarkable that in an exhibition of Edible Fungi not a single ordinary Mushroom was to be seen.

The most extensive and interesting collection was sent by A. Seth Smith, Esq., Silvermere, Cobham, Surrey (with the co-operation of his gardener, Mr. J. Quartermann), to whom the first prize, a Silver-gilt Banksian Medal, was allotted. Not less than one hundred different species were included in this collection, a portion of which were edible species. Time did not permit names to be attached to all the specimens.

The next collection was duly named and was exhibited by Mr. I. F. Rayner, Ivy Bank, Highfield, Southampton, accompanied by coloured drawings, and this was considered to be of about equal value with the next collection, viz. a small series of Edible Fungi from Yorkshire brought and exhibited by Mr. Charles Crossland, Coleridge Street, Halifax; to both of which Silver Banksian Medals were awarded.

In addition to these, small collections were sent by Mr. Carleton Rea, Foregate Street, Worcester; by Mr. C. Abbott, The Gardens, Elton Hall, Peterborough; by the Rev. W. L. W. Eyre, M.A., Swarraton Rectory, Alresford; by J. H. Holland, Esq., Dean House, Ryde; by A. Clarke, Esq., Huddersfield; by Dr. H. Franklin Parsons, Croydon; by Miss M. E. Bunyard, Maidstone; and by the Essex Field Club.

Of single specimens the most interesting was a group of *Agaricus elvensis* sent by Thos. Bristow, Esq. F.R.H.S., Marlfield Cottage, Primrose Hill, Tonbridge. This species has but rarely been found; it grows in clusters, and is of a larger size than the cultivated Mushroom, but fully its equal in firmness and flavour, and is a most desirable species for cultivation.

Another single specimen was a large one, sent by Mr. Carter Page, of the Horse Mushroom (*Agaricus arvensis*), fully eighteen inches in diameter.

Mr. Willard, of Holly Lodge, Highgate, sent for exhibition a large tropical *Polyporus* from South America. In all there were not less than forty to fifty species of edible fungi exhibited.

The thanks of the Society are specially due to Dr. Cooke, V.M.H., and his expert coadjutors, for the great trouble which they took in the matter, and for the exceedingly interesting exhibition which ensued.

TENTH ANNUAL EXHIBITION OF BRITISH-GROWN FRUIT.

HELD AT THE SOCIETY'S GARDENS AT CHISWICK,
SEPTEMBER 29, 30, AND OCTOBER 1, 1903.

THE Show of 1903 will long be memorable as being (i.) the first of the Society's long series of British Fruit Shows with which an exhibition of vegetables has been associated, and (ii.) probably the last public function connected with the Society's long tenure of the Gardens at Chiswick. With regard to the former point, it was a matter of universal rejoicing amongst gardeners that at last vegetables were accorded their rightful

position, for "kitchen gardening forms one of the most important departments that can be undertaken by a first-class gardener. A gentleman very naturally expects that his gardener should at least be able to produce first-class crops of fruit and vegetables." And if, in regard to the latter

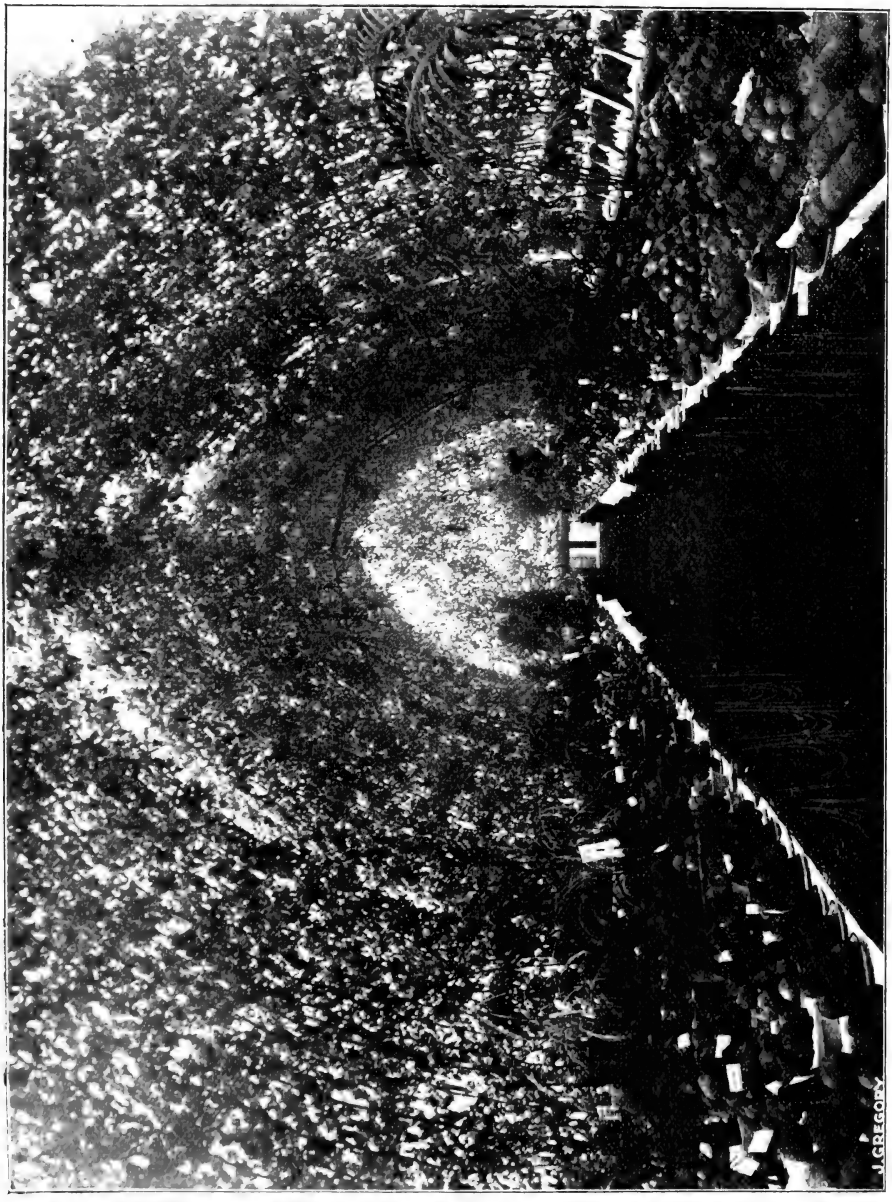


FIG. 168.—THE GREAT VINERY AT CHISWICK, SHOWING PART OF THE FRUIT SHOW.

point, a few, whose memories carried them far back to the palmy days before 1862 when Chiswick was a charming village in the country, were heard to regret the breaking of a long bond of happy connection between the Society and Chiswick, yet the great mass of gardeners attending

the Show, whilst recognising the skill with which Mr. Wright had done his best to keep the Gardens up to the mark, also fully sympathised with him in the excessive and increasing difficulties with which he has had to contend, and congratulated him on the prospect of before long possessing a garden in a really country situation and with genuine soil and abundance of light and wholesome air from heaven, uninterrupted by the pall of London smoke-fog which so continuously hangs over Chiswick in the damp days of autumn and early winter.

There is no year on record inwhich the scarcity of hardy fruit—particularly Apples, Pears, and Plums—has been so universal and widespread as in 1903. Everybody, therefore, had expected a very mediocre show, as far as these fruits were concerned; but, contrary to expectation, though the quantity was not quite so great as in some previous years, it was by no means a small show—4,500 dishes of fruit and more than 9,000 dishes of vegetables being staged—and the quality was excellent.

Of vegetables great things had been expected, and still greater things were performed. They were simply astounding—not only fine, but so perfectly clean and even, so much so as to fully substantiate the remark, "Such vegetables have never been seen since the Creation"; or, as the *Journal of Horticulture* expressed it, "Proud indeed must those individuals have felt who were mainly responsible for the introduction of the vegetable division, because of the magnificent display of useful produce shown; proud also must the Council of the Royal Horticultural Society have felt of the last Chiswick Show, and proud also everyone present who has any pride in British horticulture."

At one o'clock the President and Council entertained the judges of the Show and the five Standing Committees (the Scientific, the Fruit and Vegetable, the Floral, the Orchid, and the Narcissus and Tulip) at luncheon, about 200 guests in all being present.

During the subsequent proceedings Sir Trevor Lawrence, Bart. President, amidst the greatest applause, presented the Victoria Medal of Honour in Horticulture to Sir Thomas Hanbury, K.C.V.O., whose munificent gift to the Society of the late Mr. Wilson's garden at Wisley had been announced a few weeks previously (fig. 169).

Sir Thomas, in accepting the Medal, thanked Sir Trevor Lawrence for the kind words he had uttered, and described himself as unworthy of them and of the applause that had accompanied the gift. In regard to the gift of the garden, he had done little more than transfer a certain sum of money from one book to another, except that he had saved the beautiful garden of his friend, the late Mr. Wilson, from coming into the hands of the builder. It was now safe, and he hoped that it would remain for an indeterminable period in the hands of the Society, and that it might serve a useful purpose. "Though living in Italy," said Sir Thomas, "I am an Englishman, and in visiting England each year I rejoice to see that among those who cultivate plants a love of Nature is rapidly increasing. Such a love was possessed by Mr. Wilson in an uncommon degree."

After the presentation of the Medal to Sir Thomas the President said that, this being in all probability the last occasion on which the Society would hold a meeting at Chiswick, he might appropriately make a few remarks on the connection of the Society with its Chiswick Gardens.

It was in March, 1822, 82 years ago, that the Society first rented these gardens from the Duke of Devonshire, the area being then 33 acres, now reduced to 13. Soon after the acquisition of the Chiswick Gardens the Society began to turn them to useful account. As early as 1823 there were no fewer than 1,200 varieties of Roses cultivated, and valuable

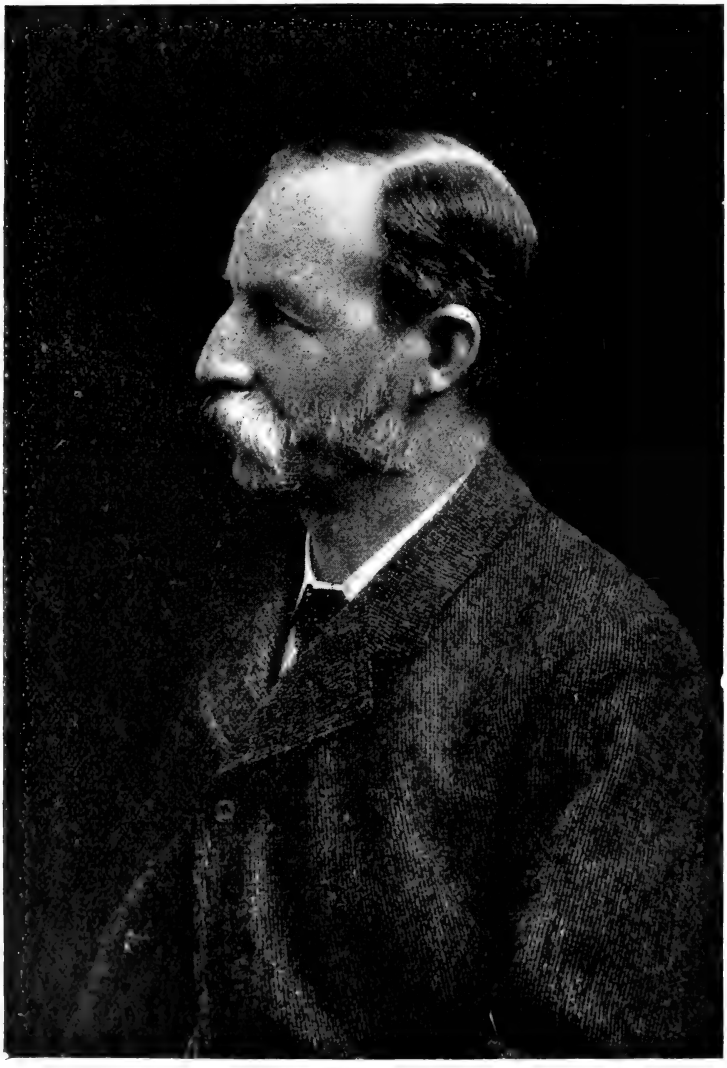


Fig. 169.—Sir Thomas Hanbury, K.C.V.O., V.M.H. (*The Garden.*)

experiments and investigations were made into the best methods of heating glass-houses. At the same time a register of meteorological observations was commenced and carried on for many years. At this time the subscription to the Society was 4*l.* 4*s.* a year, coupled with an entrance donation of 6*l.* 6*s.*

Fig. 170.—Japanese Iris Time at Wisley. (*The Garden.*)

After a trial had been made of an annual dinner, which proved anything but a success, it was decided to establish annual fêtes. These, like the dinners, though not absolutely failures involving pecuniary loss, were but a qualified success. The last fête, held in 1831, was succeeded by the first of a long series of Horticultural Exhibitions. Though subject to vicissitudes, these Exhibitions have proved in the long run a main source of success and prosperity to the Society. Nor has this been their only merit. For beyond question nothing has done more to advance the interests of the Society and to achieve for it a wide-spread popularity than the existing fortnightly and other shows, which have gradually become the centre of the Horticultural interests of the Empire, both amateur and professional.

The Chiswick Fêtes, established in 1833, did much at first to promote Horticulture in all its branches, and to secure for the Society a financial prosperity which did not, unfortunately, last. As long ago as 1844–5 they produced a profit of 3,000*l*. But the stars in their courses fought against the Society and its Exhibitions. These, which had largely depended upon the favour of the fashionable world—a notoriously fickle body—for their success, had to be given up after a run of about twenty years. On one notorious occasion, as is recorded in Andrew Murray's 'Book of the R.H.S.,' the Chiswick Fête was overtaken by a veritable deluge. On this occasion the Military lent their long cloaks, to enable fashion to get to its carriages, at 2*s*. 6*d*. a trip, and bushels of ladies' shoes and stockings reduced to pulp were picked up!

Any mention of Chiswick days would be imperfect were prominence not given to the invaluable services of the many eminent collectors sent abroad by the Society in its earlier years. The names of Reeves, Don, Douglas, McRae, Potts, Parkes, Fortune, Hartweg, and others are retained in the grateful recollection of all gardeners. One of the greatest misfortunes brought upon the Society by financial difficulties was the sale of its splendid library and drawings, and so low had its fortunes sunk that in 1887 there were but 733 paying Fellows.

The connection of Lindley with the Society, which began as Assistant Secretary in 1822, lasted forty years, his resignation taking place in 1862. Nothing has conferred greater honour on the Society than this long continuance of Dr. Lindley's work on its behalf. His name is honoured wherever throughout the world science is valued.

The President concluded by saying that the Society's connection with Chiswick could not be severed without a pang, and that they should recognise and acknowledge that the various Dukes of Devonshire had behaved to the Society as might have been expected of men of their character and position. Sir Thomas Hanbury's gift had not only provided the Society with a garden, but it had healed the somewhat pronounced differences of opinion that existed in regard to which scheme should come first, that of the erection of a Hall or the formation of the Garden.

The President then proposed the health of the various Standing Committees of the Society, viz.: the Scientific, the Fruit and Vegetable, the Floral, the Orchid, and the Narcissus and Tulip, expressing the great debt of gratitude which the Society owed to all who so kindly served upon them, often at great personal inconvenience and no little expense.

Mr. W. Bateson, M.A., F.R.S., V.M.H., in responding to the toast of the health of the various Standing Committees of the Society, said: "When it was announced that Sir Thomas Hanbury had acquired Mr. G. F. Wilson's celebrated garden at Wisley, and devoted it to the use of the Royal Horticultural Society, the hope occurred to many Fellows that this noble benefaction might lead to the creation of an institution for the experimental study of horticultural problems. The need for such an institution has long been recognised, and has been expressed by many writers, both scientific and practical. The Scientific Committee, perceiving the value of the opportunity, have already made representations to the Council on the subject, and the answers received were distinctly sympathetic. It is evident, as the Council remind us, that the New Hall must be paid for first, but when this has been done there appears to be a good prospect that the constitution of an Experimental Station at Wisley will be the next project to be undertaken.

"It is, therefore, not inappropriate that the Society should begin to consider what the work of such a station should be, the aims that are to be kept in view, and the methods by which they are to be attained. Assuming that funds will be forthcoming—an assumption which the rapid growth of the Society and the extraordinary development of horticultural interest seem to justify—how may such resources be used to the best advantage?

"In general terms the purpose of our Experimental Station will manifestly be to conduct such inquiries as are most likely to lead to knowledge of practical value in the art of horticulture. Now not merely the features special to the particular case of horticulture, but experience of every field in which knowledge of nature has been advanced so as to assist practice, indicate that the work, if it is to be of any value at all, must be *scientific*. By this it is not meant to imply that elaborate instruments or costly equipment will be needed, but simply that the observations and experiments must be made and recorded with the accuracy and minute precision without which the detection of natural law is impossible. The world of living things, like the world with which the sciences of physics and chemistry more directly deal, is pervaded by fixed rules and systems, which once perceived can be used by us to our advantage; but these laws can only be detected by the application of a rigorous method.

"The phenomena of variation and heredity are to the breeder of plants and animals what heat, electricity, and chemical affinity are to the engineer and the ironmaster. It is certain that scientific method will work for the breeder a change in his art no less momentous than that which it has worked in those other industries. This subject of variation and heredity is one of the few fields of natural knowledge still, comparatively speaking, unexplored; yet the little that we do know shows that we have only to apply a precise method of experiment to discover truths of high practical value. We have only to glance at the facts to which the work of Mendel has directly led us, to perceive what a powerful instrument has been thus provided for the breeder. The blind process of haphazard selection is at an end. In numberless cases we are now enabled to form a clear conception of what we are doing when we try, for instance, to fix a variety,

and we can guide our operations with at least an approximately true forecast of the result.

"The difficulty in all natural inquiries is to draft the questions in such a way that Nature can answer them, and it is just this method of formulation with which we are now provided.

"When the Experimental Station comes into being, as we may be confident it will, trouble may arise from the multitude of problems which the wide area of horticulture presents. We may expect a profusion of suggestions, and the choice of the special inquiries which are to be undertaken at Wisley may not be easy. The resources available must in any case be at first restricted, and success will depend on the selection of a manageable scheme of work. The programme must be modest. The number of observers will at first be small, one or two perhaps, and their attention should be concentrated. It will probably be found that the various questions we should all like to see answered from Wisley will be divisible into two classes: those which relate to breeding, that is to say the creation and fixation of types or varieties, and those which relate to cultural methods. No one who has watched the progress of horticultural biology can, I think, doubt that it is to the former that attention should be primarily devoted. Not merely are they in every sense the fundamental problems on which all the rest depend, but it is they which demand exactly the condition of permanence and continuity which a permanent corporation like the Royal Horticultural Society can provide.

"Advances in cultural methods are made with comparative ease by individuals. There are instances, as for example that of fruit-growing, in which records have to be continued over a long period of years, but they are the exception. Moreover, work on these lines is already going on both in the numerous American stations and also in England at the Woburn Experimental Fruit Farm, to mention no others, and the results attained are available for all.

"The same is true of that other great branch of horticultural progress the introduction of new and rare plants from abroad. In the early days this properly formed an important part of the Society's functions, and we are proud to remember that the work of Fortune and of Douglas was instigated and endowed by the Royal Horticultural Society. But, with the changes that have supervened in the conditions of travel and trade, this work of collecting has been taken up both by wealthy patrons of horticulture and by the great commercial firms, and it is doubtful whether the Society could do much more than is being now done by these agencies, or whether it is desirable that we should compete with them in the same field.

"If resources were unlimited all these objects might fitly be undertaken, but we must choose one object, and I believe there is none so suitable or so likely to give important results as an inquiry into the laws of breeding. As has been said, such work demands the continuity which the life of a great society provides. No other institution is engaged in exactly similar work. The knowledge to be attained is universally admitted to be that which is most urgently needed both by naturalists and practical men alike.

"It is true that breeding experiments on a large scale are being now

Fig. 171. Summer Time at Wisley. (*The Garden.*)

conducted by State institutions in other countries, especially in Canada and the United States, and valuable results are already being obtained. But in all these cases the objects are somewhat different from that which it is proposed that we should follow. Each of these establishments is engaged in the creation or improvement of some particular varieties or species of direct economic importance to the country in which the work is being done. This work, being immediately concerned with the manufacture of an economic product, does not differ essentially from that which in England is done by the large commercial houses. Great pains are taken with the work, and records, sometimes elaborate, are kept; but the particular and laborious precision which is needed to establish general truths is rarely compatible with the rapidity which is essential to economic success. The subjects of experiment, moreover, must in these cases be chosen rather with regard to the likelihood of a commercially valuable result than with reference to their fitness to advance knowledge of the principles. No one, I believe, would desire that the Royal Horticultural Society should engage in the direct production of horticultural novelties, work in which we might with difficulty hold our own against the great firms, but rather it should be our object to gain such knowledge of the fundamental properties of plants, and of the natural laws which they follow in variation and heredity, as will be of service to the practical breeder. This is not the moment to attempt any outline of the methods by which these principles can be detected; suffice it to say that through a great part of the inquiry the lines of research are clear, and all that is needed for the present is the means of following them out.

"Those who are conversant with work of the kind will know that there are two indispensable conditions. First, the area of inquiry, though restricted to a very few species—two for summer work and two for winter work would be enough for the start—must be statistically large, and space must be available for growing each of the forms chosen in at least hundreds. Secondly, the analysis must be minute, and the behaviour of the plants must be studied individually. The chief reason that so little, as regards principle, was discovered by the older experimenters on heredity was neglect of this second condition. The discrepant conclusions of different observers are mostly traceable to mistake as to the identity of the materials used. Success in these researches, as in chemistry or bacteriology, demands the most punctilious attention to the purity of the material and to the cleanliness of the work. It is unnecessary to insist that the observer must have had a thorough scientific training and be familiar with laboratory technique.

"For such an institution as that contemplated, there is magnificent work to be done. Its inception need not in any way interfere with the work that has hitherto been conducted at Chiswick, which we may assume will be continued at Wisley. The beautiful garden created by Mr. Wilson must also be maintained as an object of delight and a source of instruction to the horticultural world. But if the Society is to regain the position it once held as an important scientific organisation, it cannot do so more effectively than by taking the lead in instituting such an Experimental Station as I have indicated.

"We all rejoice that the Council and Officers have been successful in

their policy, and that, owing to that policy, the Society has reached its present prosperous position; but, that position being now achieved, we are probably united in the hope that this foundation may be used as a point of departure for the attainment of higher things.

"We are so often told that we in England are behind the times that we accept the statement as a truism. Nevertheless, if we inaugurate an institution for the scientific determination of the laws of breeding, we may for once flatter ourselves that we have taken a step ahead of our competitors, and from such a beginning it is not impossible that a work of truly national importance may spring."

Mr. Crump, V.M.H., of Madresfield Court, and Mr. Edwin Molyneux, V.M.H., of Swanmore Park, Bishop's Waltham, also replied on behalf of the Committees and the Judges.

In 1904 the show will be held in the Society's New Hall in Vincent Square on October 4, 5, and 6. The position of the Hall is clearly indicated on page 6 of the book of "Arrangements" for the year. Vegetables will not be again included, not because the Council have forgotten them or think at all slightly of them, but simply because we do not yet know whether the capacity of the New Hall would be sufficient. In 1905 we quite hope and expect they may be included. In any case the show cannot cost less than 250*l*., and Fellows who have the cause of British Fruit-growing at all at heart, instead of our depending to so great an extent on foreign supplies, are earnestly requested to subscribe towards the Prize Fund. Subscriptions should be sent to The Secretary, 117 Victoria St., Westminster, who will most gladly acknowledge them.

LIST OF SUBSCRIBERS TO THE PRIZE FUND OF 1903.

Donations to the Fund for 1904 are earnestly requested.

	£	s.	d.
Allan, W., Gunton Park Gardens, Norwich	1	0	0
Austin, J. E. & Co., St. James's Works, Kingston-on-Thames	0	10	6
Basham, John, Bassaleg, Newport, Mon.	1	11	6
Blaine, D. P., Marsham Hatch, Ashford, Kent	1	1	0
Brown, J.	0	5	0
Bunyard, Geo. & Co., Royal Nurseries, Maidstone	10	10	0
Bythway, Major, Warborough, Llanelly	1	1	0
Challis, T., Wilton House Gardens, Salisbury	0	5	0
Clinch, T., Denaway, Key Street, Kent	0	5	0
Cornford, J., Quex Park, Birchington	0	5	0
Cox, Dr., 58 High Street, Watford	0	10	6
Davies, Mrs., Whitford, Upper Deal	0	10	6
Day, J., Galloway House Gardens, Garliestown	0	7	6
Dobbie & Co., Rothesay	5	0	0
Fromow, W., & Sons, Chiswick	1	1	0
Green, Herbert, The Godlands, Maidstone	0	10	6
Greaves, B., Broome Hall Gardens, Holmwood	0	10	0
Harrison & Sons, Leicester	2	2	0
Heilbut, S., Holyport, nr. Maidenhead	1	1	0
Horne, W., & Sons, Cliffe, Rochester	10	0	0

	£	s.	d.
Horticultural College, Swanley	2	2	0
Hutchesson, F., Queen's Road, Guernsey	0	5	0
Kay, P. E., Claigmar, Church End, Finchley, N.	1	1	0
Lee, John, Higher Bebington	0	10	0
Lindley, Miss, Shooter's Hill Road, Blackheath, S.E.	2	2	0
Lloyd, F. G., J.P., Langley House, Bucks	3	3	0
McLachlan, R., Clarendon Road, Lewisham, S.E.	2	2	0
McLaren, Mrs. E., 56 Ashley Gardens, S.W.	1	1	0
Milner, R., Margam Gardens, Port Talbot	0	10	0
Munro, Miss Evelyn, 27 Eaton Place, S.W.	0	2	6
Owen, F., Thorndon, Brentwood	0	10	0
Pearson, J. R., & Sons, Lowdham, Notts — Prizes and	1	10	0
Perkins, T., & Sons, Northampton	2	2	0
Pewtress, H., Tillington Nurseries, Hereford	0	10	0
Reid, J. W., St. Croix, Leamington	0	10	6
Richards, A., 54 Duke's Avenue, Chiswick	0	10	6
Robb, Mrs., 46 Rutland Gate	0	5	0
Ross, Charles, Welford Park Gardens, Newbury	0	10	6
Savory, Rev. E., Binfield, Bracknell	1	1	0
Sharpe, C., & Co., Ltd., Sleaford	10	0	0
Sharpe, F., Sileby, Loughborough	0	5	0
Smith, Richard, & Co., Worcester	5	0	0
Spooner, S., & Sons, Hounslow	1	1	0
Sutton & Sons, Reading	25	0	0
Sydenham, Robert, Tenby Street, Birmingham	2	2	0
Turton, T., Sherborne, Dorset	1	1	0
Veitch, J., & Son, Ltd., Royal Exotic Nurseries, Chelsea	10	0	0
Veitch Memorial Fund	10	0	0
Veitch, R., & Son, Exeter	2	2	0
Walker, J., Ham Common, Surrey	1	1	0
Wallace, L. A., Sanderstead Court, Croydon	5	0	0
Wethered, H. L., Canynge Road, Clifton	1	1	0
Whiting, R. M., Credenhill, Hereford	0	10	0
White, Mrs., Walton Hall, Kelso, N.B.	1	1	0
Wigan, A. L., Forest Park, Windsor	2	2	0
Willard, J., Holly Lodge Gardens, Highgate	0	10	6
Williams, H. H., Pencalenick, Truro	1	0	0
Woodward, G., Barham Court Gardens, Teston	1	0	0
Young, J.	0	5	0

THE JUDGES.

The following gentlemen kindly acted as judges, and deserve the best thanks of the Society for their oftentimes very difficult work, viz. :—

Allan, W., Gunton Park Gardens, Norwich.
Bain, W., The Gardens, Burford, Dorking.
Barnes, N. F., Eaton Gardens, Chester.
Basham, J., Bassaleg, Newport, Mon.
Bates, W., Cross Deep Gardens, Twickenham.
Beckett, E., Aldenham House Gardens, Elstree.
Blick, C., The Warren, Hayes Common, Beckenham.
Bowerman, J., Hackwood Park Gardens, Basingstoke.
Bunyard, G., V.M.H., Royal Nurseries, Maidstone.
Challis, T., The Gardens, Wilton House, Salisbury.

Cheal, J., Crawley, Sussex.
Coomber, T., The Hendre Gardens, Monmouth.
Crump, W., V.M.H. Madresfield Court Gardens, Malvern.
Dawes, J., Ledbury Park Gardens, Ledbury.
Dean, A., 62 Richmond Road, Kingston.
Divers, W. H., Belvoir Castle Gardens, Grantham.
Douglas, J., V.M.H., Great Bookham, Surrey.
Earp, W., The Gardens, Bayham Abbey, Lamberhurst.
Fielder, C. R., North Mymms Park Gardens, near Hatfield.
Forder, H., Estate Office, Ruthin Castle, Denbigh.
Fyfe, W., Lockinge Park Gardens, Wantage.
Gibson, J., The Gardens, Danesfield, Marlow.
Gleeson, M., 12 Drayton Park, Highbury, N.
Gordon, G., V.M.H., Endsleigh, Priory Park, Kew.
Hill, E., Tring Park Gardens, Herts.
Howe, W., Park Hill Gardens, Streatham Common, S.W.
Jaques, J., Pound Street, Wendover, Bucks.
Ker, R. Wilson, Basnett Street, Liverpool.
Markham, H., The Gardens, Wrotham Park, Barnet.
Milner, R., The Gardens, Margam, Port Talbot, Glam.
Molyneux, E., V.M.H., Swanmore Park Gardens, Bishop's Waltham
Mortimer, S., Rowledge, Farnham, Surrey.
Norman, G., V.M.H., Hatfield House Gardens, Herts.
Notcutt, R. C., Woodbridge, Suffolk.
Parker, R., Goodwood Gardens, Chichester.
Paul, G., J.P., V.M.H., Cheshunt, Herts.
Pearson, A. H., The Gables, Hucknall Road, Nottingham.
Pearson, C. E., Chilwell Nurseries, Lowdham.
Poupart, W., Marsh Farm, Twickenham.
Rivers, H. S., Sawbridgeworth.
Ross, C., Welford Park Gardens, Newbury.
Salter, C. J., The Gardens, Woodhatch, Reigate.
Shea, C. E., The Elms, Foots Cray, Kent.
Thomas, Owen, V.M.H., 25 Waldeck Road, West Ealing.
Ward, A., The Gardens, Godinton, Ashford, Kent.
Willard, J., Holly Lodge, Highgate.
Wilks, Rev. W., Shirley Vicarage, Croydon.
Woodward, G., Barham Court Gardens, Teston.
Wythes, G., V.M.H., Syon House Gardens, Brentford.

THE REFEREES.

The following gentlemen very kindly held themselves at the disposal of the Society to act in conjunction with any of the Judges as referees if required, viz. :—

Bennett-Poë, J. T., M.A., V.M.H., 29 Ashley Place, S.W.
Munro, G., V.M.H., Covent Garden, W.C.

OFFICIAL PRIZE LIST.

(The address and the Gardener's name are entered on the first occurrence, but afterwards only the Owner's name is recorded.)

Division I.

Fruits, grown under Glass or otherwise.

Open to Gardeners and Amateurs only.

Note.—Exhibitors can compete in one Class only of Classes 1, 2; and of Classes 3, 4.

Class **1.**—Collection of 9 dishes of Ripe Dessert Fruit:—6 kinds at least; only 1 Pine, 1 Melon, 1 Black and 1 White Grape allowed; not more than two varieties of any other kind, and no two dishes of the same variety.

First Prize, Veitch Memorial Medal and £5; Second, £4; Third, £2.

1. The Rt. Hon. Earl of Harrington, Derby (gr. J. H. Goodacre).
2. The Hon. Sir Charles Swinfen Eady, Weybridge (gr. J. Lock).
3. No award.

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, Williams Memorial Medal and £3; Second, £2. 10*s.*; Third, £1. 5*s.*

1. J. W. Fleming, Esq., Romsey (gr. W. Mitchell).
2. } No award.
3. }

Class **3.**—Grapes, 6 distinct varieties, 3 bunches of each; both Black and White must be represented.

First Prize, Silver Cup and £3; Second, £3.

1. The Earl of Harrington.
2. No award.

Class **4.**—Grapes, 4 varieties, selected from the following: 'Madresfield Court,' 'Mrs. Pince,' 'Muscat Hamburgh,' 'Muscat of Alexandria' or 'Canon Hall' (not both), 'Mrs. Pearson,' and 'Dr. Hogg,' 3 bunches of each.

First Prize, £4; Second, £3; Third, £2.

No entry.

Class **5.**—Grapes, Black Hamburgh, 3 bunches.

First Prize, £1. 10*s.*; Second, £1; Third, 10*s.*

1. J. W. Fleming, Esq.
2. The Earl of Harrington.
3. Miss Ridge, Englefield Green (gr. G. Lane).

Class **6.**—Grapes, 'Mrs. Pince,' 3 bunches.

First Prize, £1. 10*s.*; Second, £1.

1. J. W. Fleming, Esq.
2. The Rt. Hon. Earl of Galloway, Garliestown, N.B. (gr. J. Day).

Class **7.**—Grapes, Alicante, 3 bunches.
First Prize, £1. 10*s.*; Second, £1; Third, 10*s.*
1. G. C. Raphael, Esq., Englefield Green (gr. H. H. Brown).
2. S. Platt, Esq., Twyford (gr. M. Brodie).
3. Col. the Hon. C. Harbord, Norwich (gr. W. Allan).

Class **8.**—Grapes, 'Madresfield Court,' 3 bunches.
First Prize, £1. 10*s.*; Second, £1; Third, 10*s.*
1. J. W. Fleming, Esq.
2. Miss Talbot, Port Talbot (gr. R. Milner).
3. No award.

Class **9.**—Grapes, any other Black Grape, 3 bunches.
First Prize, £1. 10*s.*; Second, £1; Third, 10*s.*
1. J. W. Fleming, Esq.
2. Col. Archer-Houblon, Bishop's Stortford (gr. W. Harrison).
3. Col. the Hon. C. Harbord.

Class **10.**—Grapes, 'Muscat of Alexandria,' 3 bunches.
First Prize, £2. 10*s.*; Second, £1. 10*s.*; Third, £1.
1. The Earl of Harrington.
2. The Hon. Sir Charles Swinfen Eady.
3. Col. the Hon. C. Harbord.

Class **11.**—Grapes, any other White Grape, 3 bunches.
First Prize, £1. 10*s.*; Second, £1; Third, 10*s.*
1. C. Bayer, Esq., Forest Hill (gr. W. Taylor).
2. The Hon. Sir Charles Swinfen Eady.
3. Captain Clive, Hereford (gr. R. Grindod).

Class **12.**—Grapes, 3 bunches of any Frontignan varieties.
First Prize, £1. 10*s.*; Second, £1.
No entry.

Class **13.**—Collection of Hardy Fruit, 30 dishes distinct, grown entirely in the open; not to include more than 12 varieties of Apples or 8 of Pears.
First Prize, The Hogg Medal and £3; Second, £2; Third, £1.
1. Major Powell Cotton, Birchington (gr. J. Cornford).
2. T. L. Boyd, Esq., Tonbridge (gr. E. Coleman).
3. No award.

Division II.

Open to Nurserymen and Market Growers only.

Nurserymen must exhibit as individuals or as firms, and must have actually grown all they exhibit. Combinations of individuals or firms are not allowed, nor collections of produce from districts.

Nurserymen desiring to exhibit at this Show must make application for space as under Class 14, 15, or 16. No other spaces but the above can be allotted to Nurserymen wishing to show fruit. Exhibitors can only enter in one of Classes 14 and 15.

Nurserymen may adopt any method of staging they desire, subject to the following reservations: (*a*) The number of fruits is not limited, but the baskets or dishes must not exceed 15 inches in diameter if circular, or 19 × 15 if rectangular;

(*b*) Duplicate trees are permitted, but not duplicate baskets or dishes of fruit; (*c*) Trees are not admissible in 14, 15.

No awards of any sort will be made to Nurserymen who do not conform to the above regulations.

Important.—Nurserymen having entered and finding themselves unable to exhibit are *particularly* requested to give three days' notice to the Superintendent, R.H.S. Gardens, Chiswick, London, W.

Allotment of table-space will be made to Nurserymen on the following scales:—

For Fruit grown entirely out of doors.

Class **14.**—32 feet run of 6 feet tabling.

First Prize, Gold Medal; Second, Silver-gilt Knightian; Third, Hogg Memorial Medal.

1. Messrs. G. Bunyard & Co., Maidstone.
2. Messrs. J. Peed & Son, West Norwood.
3. Mr. John Basham, Newport, Mon.

Class **15.**—16 feet run of 6 feet tabling.

First Prize, Hogg Memorial Medal; Second, Silver-gilt Knightian; Third, Silver Knightian.

1. Mr. J. B. Colwill, Sidmouth.
2. Mr. G. Mount, Canterbury.
3. Messrs. Pewtress Bros., Hereford.

For Orchard-house Fruit and Trees.

Class **16.**—32 feet run of 6 feet tabling.

First Prize, Gold Medal.

1. Messrs. G. Bunyard & Co.

Division III.

Fruits grown in the Open Air—Except Class 30.

Open to Gardeners and Amateurs only. Nurserymen and Market Growers excluded.

Exhibitors of Apples or Pears in Division III. are excluded from Division V.

Note.—Exhibitors can compete in one Class only of the Classes 17, 18, 19; of 22, 23, 24, 25; of 26, 27; of 28, 29.

Class **17.**—Apples, 24 dishes distinct, 16 Cooking, 8 Dessert. The latter to be placed in the front row.

First Prize, £3. 10*s.*; Second, £2; Third, £1. 10*s.*

1. W. Bythway, Esq., Llanelly (gr. W. Wilkins).
2. Mrs. Haywood, Reigate (gr. C. J. Salter).
3. R. H. B. Marsham, Esq., Maidstone (gr. W. Lewis).

Class **18.**—Apples, 18 dishes distinct, 12 Cooking, 6 Dessert. The latter to be placed in the front row.

First Prize, £2. 10*s.*; Second, £1. 10*s.*; Third, £1.

1. Mrs. Alexander, Maidstone (gr. C. Crane).
2. T. Ridgwell, Esq., Grays.
3. Major Powell Cotton.

Class **19.**—Apples, 12 dishes distinct, 8 Cooking, 4 Dessert. The latter to be placed in the front row.

First Prize, £2; Second, £1; Third, 15*s*.

1. Mrs. Hanbury, Barnet (gr. A. Porteous).
2. H. Partridge, Esq., Bletchingley (gr. J. W. Barks).
3. No award.

Class **20.**—Cooking Apples, 6 dishes, distinct.

First Prize, £1; Second, 15*s*.

1. The Rt. Hon. Lord Biddulph of Ledbury, Ledbury (gr. J. Dawes).
2. W. Bythway, Esq.

Class **21.**—Dessert Apples, 6 dishes, distinct.

First Prize, £1; Second, 15*s*.

1. W. Bythway, Esq.
2. R. H. B. Marsham, Esq.

Class **22.**—Dessert Pears, 18 dishes, distinct.

First Prize, £3. 10*s*.; Second, £2; Third, £1.

1. Roger Leigh, Esq., Teston (gr. G. Woodward).
2. Sir Marcus Samuel, Bart., Maidstone (gr. H. Bacon).
3. Major Powell Cotton.

Class **23.**—Dessert Pears, 12 dishes, distinct.

First Prize, £2; Second, £1; Third, 15*s*.

No entry.

Class **24.**—Dessert Pears, 9 dishes, distinct.

First Prize, £1. 10*s*.; Second, 17*s*. 6*d*.

1. F. A. Bevan, Esq., New Barnet (gr. H. Parr).
2. No award.

Class **25.**—Dessert Pears, 6 dishes, distinct.

First Prize, £1; Second, 15*s*.

1. A. Benson, Esq., Merstham (gr. W. Mancey).
2. C. H. Garton, Esq., Banstead Wood (gr. J. Moore).

Class **26.**—Peaches, grown entirely out of doors, 3 dishes, distinct.

First Prize, £1; Second, 15*s*.

1. Roger Leigh, Esq.
2. The Earl of Harrington.

Class **27.**—Peaches, grown entirely out of doors, 1 dish of one variety.

First Prize, 10*s*.; Second, 7*s*.

1. The Rt. Hon. Lord Braybrooke, Saffron Walden (gr. J. Vert).
2. J. W. Fleming, Esq.

Class **28.**—Nectarines, grown entirely out of doors, 3 dishes, distinct.

First Prize, £1; Second, 15*s*.

1. The Earl of Harrington.
2. No award.

Class **29.**—Nectarines, grown entirely out of doors, 1 dish of one variety.

First Prize, 10*s.*; Second, 7*s.*

1. No award.
2. The Hon. Sir Charles Swinfen Eady.

Class **30.**—Plums, grown under Glass, 6 dishes, distinct.

First Prize, £1. 10*s.*; Second, 15*s.*

No award..

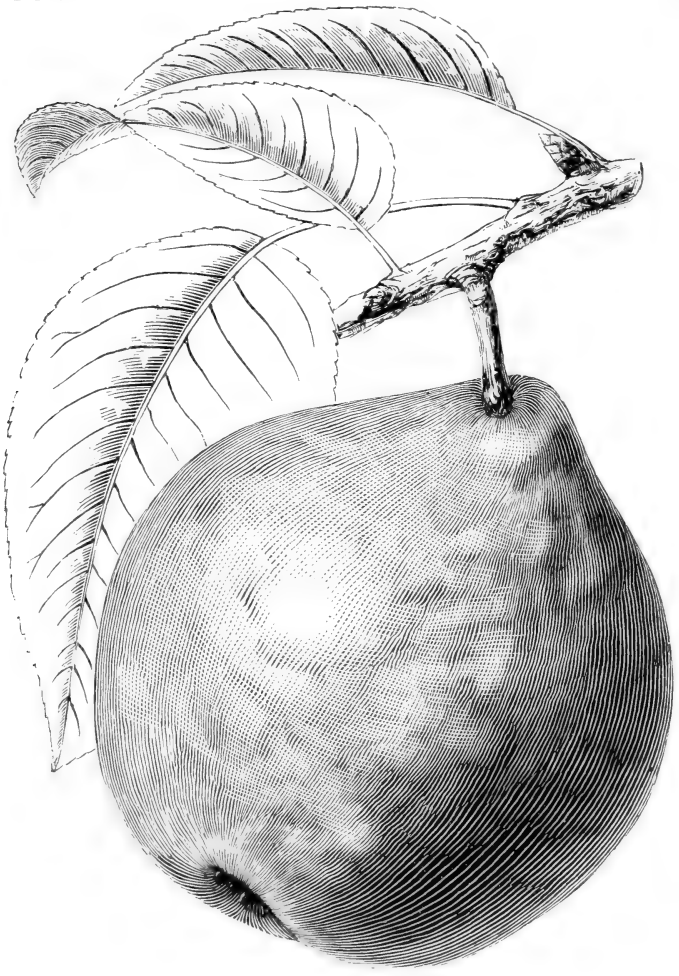


Fig. 172.—Pear 'Marie Benoist.' (*Journal of Horticulture.*)

Class **31.** Plums, 6 dishes, 2 Dessert and 4 Cooking, distinct.

First Prize, £1. 10*s.*; Second, 15*s.*

1. Major Powell Cotton.
2. No award.

Class **32.**—Plums, 3 dishes of Gages, distinct.

First Prize, 15*s.*; Second, 10*s.*

No award.

Class **33.**—Plums, 1 dish of Dessert, of one variety.
First Prize, 7*s.*; Second, 5*s.*

1. The Lord Braybrooke.
2. Mrs. Alexander.

Class **34.**—Plums, 1 dish of Cooking, of one variety.
First Prize, 7*s.*; Second, 5*s.*

1. The Lord Braybrooke.
2. G. J. Gribble, Biggleswade (gr. A. Carlisle).

Class **35.**—Morello Cherries, 50 Fruits.
First Prize, 7*s.*; Second, 5*s.*

1. J. B. Fortescue, Esq., Maidenhead (gr. C. Page).
2. Hon. D. P. Bouverie, Highworth (gr. D. Haines).

Class **36.**—Grapes, outdoors, Basket of about 6 lb. weight.
First Prize, 15*s.*; Second, 7*s.* 6*d.*

No award.

Division IV.

Special District County Prizes.

Open to Gardeners and Amateurs only.

(In this Division all fruit must have been grown in the open.)

N.B.—Exhibitors in Division IV. must not compete in Division II., or in Classes 1, 2, 3, 4, 17, 18, 19, 22, 23, 24.

Class **AA.**—Apples, 6 dishes, distinct, 4 Cooking, 2 Dessert.
1st Prize, £1 and 3rd class Single Fare from Exhibitor's nearest railway station to London; 2nd Prize, 15*s.* and Railway Fare as above.

Class **BB.**—Dessert Pears, 6 dishes, distinct.
1st Prize, £1. 10s. and Railway Fare as above; 2nd Prize, £1 and Railway Fare as above.

The two above classes, AA and BB, are repeated eleven times as follows, and Exhibitors must enter for them thus: "Class AA 37" or "BB 38," and so on, to make it quite clear whether they mean Apples or Pears.

Class **37.**—Open only to Kent Growers.

AA.—Apples.
1. G. H. Dean, Esq., Sittingbourne (gr. W. T. Stowers).
2. T. L. Boyd, Esq.

BB.—Pears.
1. T. L. Boyd, Esq.
2. No award.

Class **38.**—Open only to Growers in Surrey, Sussex, Hants, Dorset, Somerset, Devon, and Cornwall.

AA.—Apples.
1. J. F. G. Bannatyne, Esq., Exeter (gr. J. Ellicott).
2. M. P. Grace, Esq., Battle (gr. H. Avery).

BB.—Pears.
1. J. K. D. Wingfield-Digby, Esq., Sherborne (gr. T. Turton).
2. The Earl of Ashburnham, Battle (gr. G. Grigg).

Class **39.**—Open only to Growers in Wilts, Gloucester, Oxford, Bucks, Berks, Beds, Herts, and Middlesex.

AA.—Apples.
1. Sir A. K. B. Osborn, Bt., Shefford (gr. C. J. Collett).
2. A. W. G. Wright, Esq., Newent (gr. W. H. Davies).

BB.—Pears.
1. Mrs. St. Vincent Ames, Westbury-on-Trym (gr. W. Bannister).
2. G. J. Gribble, Esq.

Class **40.**—Open only to Growers in Essex, Suffolk, Norfolk, Cambridge, Hunts, and Rutland.

AA.—Apples.
1. N. R. Page, Esq., Clacton.
2. Col. Archer-Houblon (gr. W. Harrison).

BB.—Pears.
1. Col. The Hon. C. Harbord.
2. Rt. Hon. Lord Braybrooke.

Class **41.**—Open only to Growers in Lincoln, Northampton, Warwick, Leicester, Notts, Derby, Staffs, Shropshire, and Cheshire.

AA.—Apples.
1. John Lee, Esq., Bebington.
2. H. Knott, Esq., Stamford (gr. J. Naylor).

BB.—Pears.
1. Duke of Rutland, Grantham (gr. W. H. Divers).
2. H. Knott, Esq., Stamford.

Class **42.**—Open only to Growers in Worcester, Hereford, Monmouth, Glamorgan, Carmarthen, and Pembroke.

AA.—Apples.
1. Lord Biddulph.
2. J. H. Wootton, Esq., Hereford.

BB.—Pears.
1. Lord Biddulph.
2. No award.

Class **43.**—Open only to Growers in the other Counties of Wales.

AA.—Apples.
1. Col. Cornwallis West, Ruthin (gr. H. Forder).
2. Mr. R. A. Horspool, Ruabon.

BB.—Pears.
1. Mr. R. A. Horspool.
2. Mrs. Davies-Evans, Llanybyther.

Class **44.**—Open only to Growers in the Six Northern Counties of England, and in the Isle of Man.

AA.—Apples.
1. Mr. J. McIndoe, V.M.H., Guisboro'.
2. H. Thellusson, Esq., Doncaster (gr. W. Chuck).

BB.—Pears.
1. H. Thellusson, Esq.
2. The Earl of Lathom, Ormskirk (gr. B. Ashton).

Class **45.**—Open only to Growers in Scotland.

AA.—Apples.
1. The Earl of Galloway.
2. The Earl of Home, Coldstream, N.B (gr. J Cairns).

BB.—Pears.
1. The Earl of Galloway.
2. The Earl of Home.

Class **46.**—Open only to Growers in Ireland.

AA.—Apples.
1. H. F. Broad, Esq., Cork.
2. Viscount Duncannon, Piltown (gr. J. G. Weston).

BB.—Pears. No award.

Class **47.**—Open only to Growers in the Channel Islands.

AA.—Apples. No entry.

BB.—Pears. No entry.

Division V.

Single Dishes of Fruit grown in the Open Air.

Open to Gardeners and Amateurs only. Nurserymen and Market Growers excluded.

Prizes in each Class (except 52, 61, 64, 70, 71, 75 and 88), 1st, 7*s.*; 2nd, 5*s.*

Choice Dessert Apples.

Class **48.**—Adams's Pearmain.

1. J. F. G. Bannatyne, Esq.
2. Mrs. G. Pearson, Hereford (gr. R. Smith).

Class **49.**—Allington Pippin.

1. Miss Talbot.
2. G. H. Dean, Esq., Sittingbourne (gr. W. T. Stowers).

Class **50.**—American Mother.

1. The Rt. Hon. Lord Poltimore, Exeter (gr. T. H. Slade).
2. No award.

Class **51.**—Blenheim Orange. (See Class 63.)

Small highly-coloured fruits which will pass through a 3-inch ring.

1. T. Lloyd Davies, Esq., Addlestone (gr. G. Crabb).
2. G. H. Dean, Esq.

Class **52.**—Charles Ross.

Nurserymen and Market Growers not excluded in this Class.

First Prize, £5; Second, £3; Third, £2.

Presented by Messrs. Horne, of Cliffe, Rochester.

1. Mr. J. B. Colwill, Sidmouth.
2. } No award.
3. }

Class **53.**—Cox's Orange Pippin.

1. G. H. Dean, Esq.
2. W. Greenwell, Esq., Marden Park (gr. W. Lintott).

Class **54.**—Egremont Russet.

1. W. Greenwell, Esq.
2. C. P. Wykeham-Martin, Esq., Maidstone (gr. D. McAinsh).

Class **55.**—James Grieve.
1. J. T. Atkinson, Esq., Caversham.
2. Col. Archer-Houblon (gr. W. Harrison).

Class **56.**—King of the Pippins.
1. Rev. T. McMurdie, Weybridge (gr. A. Basile).
2. A. W. G. Wright, Esq.

Class **57.**—Mannington's Pearmain.
1. John Lee, Esq.
2. T. L. Boyd, Esq.

Class **58.**—Margil.
1. G. J. Gribble, Esq.
2. No award.

Class **59.**—Red Astrachan.
No entry.

Class **60.**—Ribston Pippin.
1. The Earl of Ashburnham.
2. G. H. Dean, Esq.

Class **61.**—Any other variety not named above.
Four Prizes, 7*s.*, 6*s.*, 5*s.*, 4*s.*

An Exhibitor may only enter one variety in Class 61.

In this Class 8 Fruits must be shown to a dish for the Judges to be able to taste two of them.

1. Col. Archer-Houblon (gr. W. Harrison).
2. A. W. G. Wright, Esq.
3. G. J. Gribble, Esq.
4. Col. The Hon. C. Harbord.

Choice Cooking Apples.

Class **62.**—Bismarck.
1. G. H. Dean, Esq.
2. H. H. Williams, Esq., Truro.

Class **63.**—Blenheim Orange. Large fruits. (See Class 51.)
1. Rev. T. McMurdie.
2. G. H. Dean, Esq.

Class **64.**—Bramley's Seedling. 1st Prize, 20*s.*; 2nd, 10*s.*; 3rd, 5*s.*

Prizes given by Messrs. H. Merryweather, The Nurseries, Southwell.

1. G. H. Dean, Esq.
2. Mrs. G. Pearson.
3. Rev. T. McMurdie.

Class **65.**—Gascoigne's Scarlet. (Fig. 173.)
1. G. H. Dean, Esq.
2. W. Greenwell, Esq.

Class **66.**—Golden Noble.
1. A. W. G. Wright, Esq.
2. G. H. Dean, Esq.

Class **67.**—Lane's Prince Albert.

1. G. H. Dean, Esq.
2. No award.

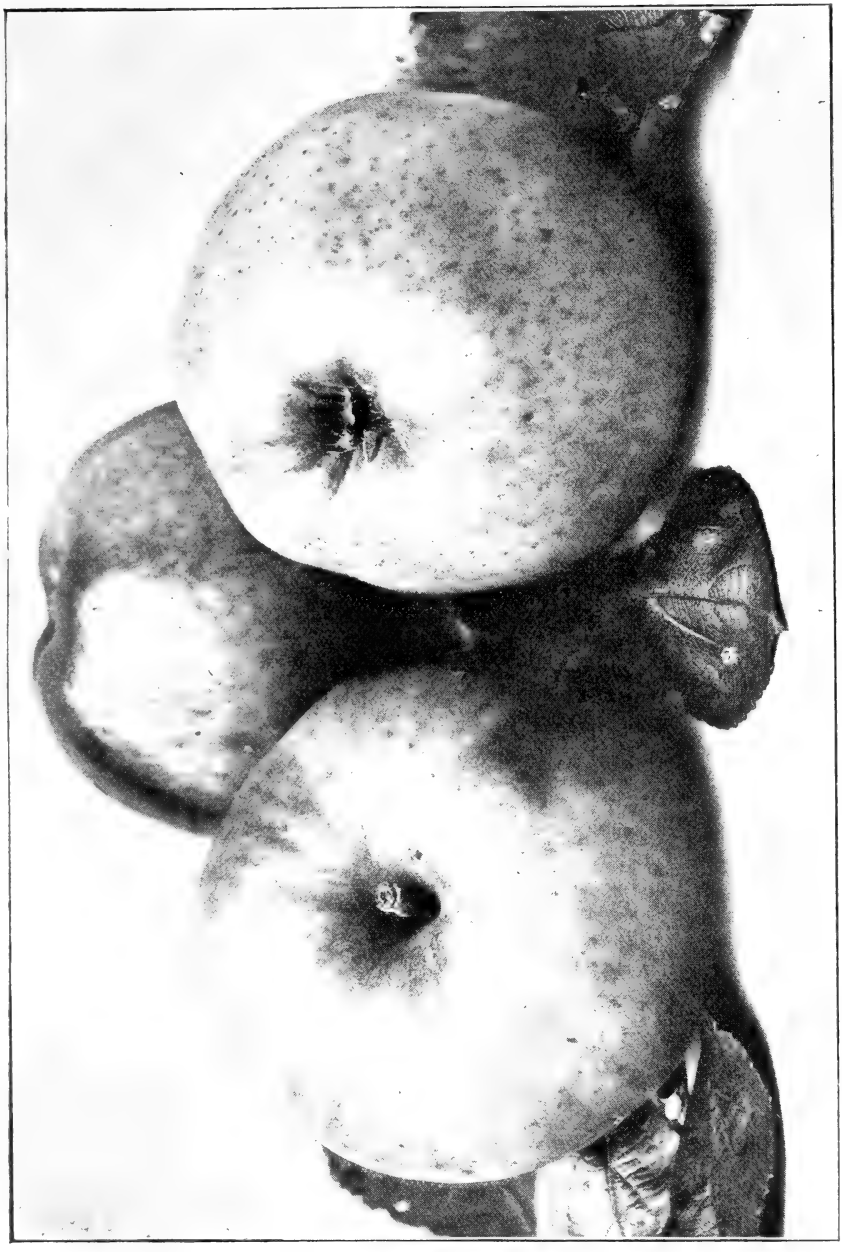


Fig. 173.—Apple 'Gascoigne's Scarlet Seedling.' (*Journal of Horticulture.*)

Class **68.**—Lord Derby.

1. H. C. Smith, Esq., Roehampton (gr. W. Wallace).
2. G. H. Dean, Esq.

Class **69.**—Mère de Ménage.

1. G. H. Dean, Esq.
2. J. B. Fortescue, Esq.

Class **70.**—Newton Wonder.

First Prize, 20*s.*; Second, 10*s.*; Third, 5*s.*

Prizes presented by Messrs. J. R. Pearson & Sons, Lowdham, Notts.

Open only to Exhibitors living in Cardigan, Radnor, Shropshire, Stafford, Warwick, Northampton, Bedford, Cambridge, Essex, or counties further north.

1. Col. The Hon. C. Harbord.
2. The Earl of Galloway.
3. The Duke of Rutland.

Class **71.**—Newton Wonder.

First Prize, 20*s.*; Second, 10*s.*; Third, 5*s.*

Prizes presented by Messrs. J. R. Pearson & Sons, Lowdham, Notts.

Open only to Exhibitors living south of the before-named counties.

1. G. H. Dean, Esq.
2. W. Greenwell, Esq.
3. Col. Vivian, Trowbridge (gr. W. Strugnell).

Class **72.**—Peasgood's Nonesuch.

1. G. H. Dean, Esq.
1. J. B. Fortescue, Esq.

Class **73.**—Stirling Castle.

1. Col. Archer-Houblon, Newbury (gr. C. Ross).
2. J. K. D. Wingfield-Digby, Esq.

Class **74.**—Warner's King.

1. J. Lee, Esq.
2. G. H. Dean, Esq.

Class **75.**—Any other variety not named above.

Four Prizes, 7*s.*, 6*s.*, 5*s.*, 4*s.*

An Exhibitor may only enter one variety in Class 75.

In this Class 8 fruits must be shown to a dish for the Judges to be able to taste two of them.

1. No award.
2. The Lord Braybrooke.
3. T. L. Boyd, Esq.
4. M. P. Grace, Esq.

Choice Dessert Pears.

Class **76.**—Beurré Dumont.

No entry.

Class **77.**—Beurré Hardy.

No entry.

Class **78.**—Beurré Superfin.

1. J. K. D. Wingfield-Digby, Esq.
2. Mrs. St. Vincent Ames.

Class **79.**—Comte de Lamy.
1. J. T. Charlesworth, Esq., Redhill (gr. T. W. Herbert).
2. No award.

Class **80.**—Doyenne du Comice.
1. The Rt. Hon. Lord Northbourne, Dover (g. E. Gilmore).
2. H. Partridge, Esq.

Class **81.**—Durondeau.
1. J. K. D. Wingfield-Digby, Esq.
2. Col. The Hon. C. Harbord.

Class **82.**—Emile d'Heyst.
1. Col. The Hon. C. Harbord.
2. C. P. Wykeham-Martin, Esq.

Class **83.**—Fondante d'Automne.
1. No award.
2. Col. The Hon. C. Harbord.

Class **84.**—Louise Bonne of Jersey.
1. The Earl of Ashburnham.
2. Col. The Hon. C. Harbord.

Class **85.**—Marie Louise.
1. Col. The Hon. C. Harbord.
2. A. Benson, Esq.

Class **86.**—Pitmaston Duchess.
1. H. Partridge, Esq.
2. Col. The Hon. C. Harbord.

Class **87.**—Thompson's.
1. Col. The Hon. C. Harbord.
2. No award.

Class **88.**—Any other variety not named above.

Four Prizes: 7*s.*, 6*s.*, 5*s.*, 4*s.*

An Exhibitor may only enter one variety in Class 88.

In this Class 8 Fruits must be shown to a dish for the Judges to be able to taste two of them.

1. Col. The Hon. C. Harbord.
2. Col. Archer-Houblon (gr. W. Harrison).
3. H. Partridge, Esq.
4. Col. Archer-Houblon (gr. C. Ross).

Division VI.

Fruit: Miscellaneous.

Exhibitors may not enter in both 90 and 91.

Dried or preserved Fruits of any kind may be shown, subject to the condition of their being tested by the Judges, and provided they have been grown in the British Islands.

Class **89.**—Home Preserved or Home Bottled British-grown Fruits. *Open.* This exhibit must not occupy a space greater than 8 feet by 6

feet, and must not be built up more than 2 feet high in the centre. Jams in clear glass jars or bottles; bottled fruits in clear glass bottles; small quantities of fruits, preserved, dried, or evaporated in any other way, may be included, but all alike must be British-grown and British-prepared.

First Prize, Gold Medal; Second, Silver-gilt Knightian Medal.

1. Lady Warwick Hostel, Studley.
2. Messrs. Austin & Co., Kingston-on-Thames.

Class **89 F.**—Foreign Grown and Preserved or Bottled Fruits. *Open.* This exhibit must not occupy a space greater than 8 feet by 6 feet, and must not be built up more than 2 feet high in the centre. Jams in clear glass jars or bottles; bottled fruits in clear glass bottles; small quantities of fruits, preserved, dried, or evaporated in any other way, may be included, but all alike must be Foreign-grown and Foreign-prepared.

First Prize, Gold Medal; Second, Silver Banksian Medal.

1. No award.
2. Miss C. E. Martin, New York.

Class **90.**—Exhibits of eighteen bottles of Bottled Fruits (including six different kinds at least), bottled and shown by exhibitors who do not sell their produce or in any way work for the trade (wholesale or retail), but only and entirely for their own household consumption.

First Prize, £4; Second, £3.

1. Mrs. C. P. Markham, Chesterfield (Mrs. Banks).
2. Mrs. E. Beckett, Elstree.

Class **91.**—Exhibits of a dozen bottles of Bottled Fruits (including four different kinds at least), bottled and shown by exhibitors who do not sell their produce or in any way work for the trade (wholesale or retail), but only and entirely for their own household consumption.

First Prize, £3; Second, £2.

1. Mrs. J. Bushnell, Sandling.
2. Miss A. M. Smith, Southwick.

Division VII.

Vegetables.

Note.—The Society will supply the labels on which the names of the various items are to be written or printed, and no other labels will be allowed. Application must be made for the number of labels required when the entry form is sent in. Correctness of naming will have great weight with the Judges.

Excellence of quality rather than superiority of size is what will be looked for by the Judges.

Exhibitors may not enter in both 92 and 92A or 93 and 94.

N.B. In Collections the number of each vegetable to a dish must follow the numbers asked for in Clauses 98–158. Duplicate dishes of the same variety not allowed.

Class **92.**—Collection of Vegetables occupying not more than 100 square feet (*i.e.* 33 × 3). Open to the Trade only. Medals according to merit.

First Prize, Silver-gilt Knightian Medal.

1. Messrs. R. Smith & Co., Worcester.

Class **92 A.**—Collection of Vegetables occupying not more than 50 square feet (*i.e.* 17 × 3). Open to the Trade only. Medals according to merit.

First Prize, Silver-gilt Knightian Medal; Second, Silver-gilt Banksian Medal; Third, Silver Knightian.

1. Messrs. R. Veitch & Son, Exeter.
2. Messrs. J. Cheal & Sons, Crawley.
3. Messrs. G. Bunyard & Co.

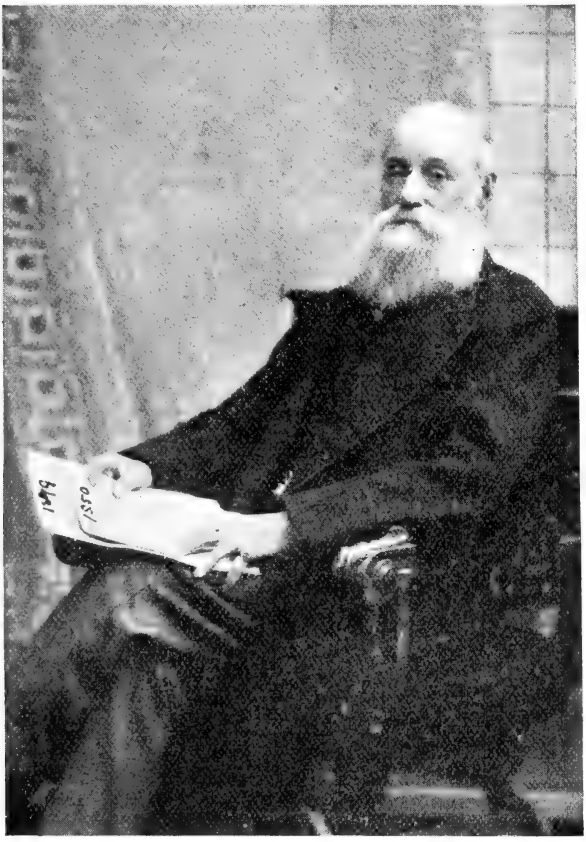


Fig. 174.—Mr. Robert Fenn, V.M.H., the Veteran Raiser of New Varieties of the Potato. (*The Garden.*)

Class **93.**—Collection of Vegetables occupying not more than 50 square feet (*i.e.* 17 × 3). Amateurs.

First Prize, The Sherwood Silver Cup (value £10); Second, £5; Third, £3; Fourth, £2.

1. The Rt. Hon. Lord Aldenham, Elstree (gr. E. Beckett).
2. R. W. Hudson, Esq., Marlow (gr. J. Gibson).
3. The Rt. Hon. Lady Wantage, Lockinge (gr. W. Fyfe).
4. B. H. Hill, Esq., Crediton (gr. G. Lock).

Class **94.**—Collection of Vegetables occupying not more than 24 square feet (*i.e.* 8 × 3). Amateurs.

First Prize, Veitch Memorial Medal and £5; Second, £3; Third, £2; Fourth, £1.

1. The Rt. Hon. Lord Bolton, Basingstoke (gr. J. Bowerman).
2. Rev. T. McMurdie.
3. Hon. D. P. Bouverie.
4. No award.

Class **95.**—Collection of Pumpkins and Gourds occupying not more than 50 square feet (*i.e.* 17 × 3). Open.

Prizes, Medals.

No entry.

Class **96.**—Collection of 18 Varieties of Potatos, 6 tubers of each. Open to the Trade only.

First Prize, Silver-gilt Knightian Medal; Second, Silver-gilt Banksian; Third, Silver Knightian.

1. Mr. R. W. Green, Wisbech.
2. Mr. J. B. Colwill.
3. Messrs. R. Veitch & Son.

Class **97.**—Collection of 12 Varieties of Potatos, 6 tubers of each. Amateurs.

First Prize, £2 and Bronze Williams Memorial Medal; Second, £2; Third, £1.

1. The Earl of Lathom.
2. A. Ayling, Esq., Newhaven.
3. Earl Spencer, Northampton (gr. S. Cole).

Division VIII.

Open to Amateurs only.

Unless otherwise stated, the Prizes in Division VIII. are uniformly—
First, 5*s.*; Second, 3*s.*; Third, 2*s.*

All marked thus * are to have the tops left on.

All marked thus ¶ are to be shown as pulled up from the ground.

No one may enter in two classes in Division VIII. which differ only in respect the number of Plants, roots, tubers, &c., asked for.

No one may take more than one Prize in any one class.

Class **98.**—6 Globe Artichokes.

1. Lord Aldenham.
2. Mrs. Denison, Little Gaddesden (gr. A. G. Gentle).
3. Rev. T. McMurdie.

Class **99.**—24 Dwarf or Climbing French Beans.

No award.

Class **100.** 24 Scarlet or White Runner Beans.

1. The Earl of Lathom.
2. H. Partridge, Esq.
3. B. H. Hill, Esq.

Class **101.**—6 Red Top Beet, round.
1. Mrs. Denison.
2. Rev. T. McMurdie.
3. B. H. Hill, Esq.

* Class **102.**—6 Red Top Beet, long.
1. Earl Spencer.
2. J. Huntley, Esq., Coldstream.
3. Col. Cornwallis West.

* Class **103.**—6 Green Top Beet.
1. A. A. Spiers, Esq., Renfrew (gr. J. Brown).
2. } No award.
3. }

¶ Class **104.**—3 Plants Borecole, green curled.
1. A. A. Spiers, Esq.
2. J. Ireland, Esq., Kilbirnie.
3. No award.

¶ Class **105.**—3 Plants Borecole, of any other variety.
No entry.

¶ Class **106.**—3 Plants Cauliflower or Autumn Broccoli.
1. Earl Spencer.
2. Lord Aldenham.
3. F. M. Brown, Esq., Southfields (gr. W. Waite).

¶ Class **107.**—3 Plants Brussels Sprouts, tall.
No entry.

¶ Class **108.**—3 Plants Brussels Sprouts, dwarf.
No entry.

¶ Class **109.**—3 Plants Cabbage or Colewort, flathead or drumhead.
No entry.

¶ Class **110.**—3 Plants Cabbage or Colewort, conical or round.
1. A. A. Spiers, Esq.
2. Mr. R. A. Horspool.
3. H. Partridge, Esq.

¶ Class **111.**—3 Plants Red Cabbage, large.
No entry.

¶ Class **112.**—3 Plants Red Cabbage, dwarf.
1. Lord Aldenham.
2. A. A. Spiers, Esq.
3. No award.

¶ Class **113.**—3 Plants Savoys, Ulm.
No entry.

¶ Class **114.**—3 Plants Savoys, drumhead.
1. C. Duruz, Esq., Hythe.
2. } No award.
3. }

¶ Class **115.**—3 Plants Savoys, any other variety.
1. A. A. Spiers, Esq.
2. Mrs. Denison.
3. No award.

* Class **116.**—6 Carrots, horn or stump rooted.
1. Mr. R. A. Horspool.
2. B. H. Hill, Esq.
3. Mrs. Denison.

* Class **117.**—6 Carrots, long.
1. B. H. Hill, Esq.
2. A. A. Spiers, Esq.
3. J. Kennedy, Esq., Millport.

¶ Class **118.**—3 Plants of Celery, red, long.
1. Lord Aldenham.
2. A. A. Spiers, Esq.
3. Lady Wantage.

¶ Class **119.**—3 Plants Celery, red, dwarf.
No award.

¶ Class **120.**—3 Plants Celery, white, long.
1. Lord Aldenham.
2. Mr. R. A. Horspool.
3. No award.

¶ Class **121.**—3 Plants Celery, white, dwarf.
1. Lord Aldenham.
2. } No award.
3. }

¶ Class **122.**—3 Plants Celeriac.
No entry.

¶ Class **123.**—3 Plants Couve Tronchuda.
No entry.

Class **124.**—2 brace of Cucumbers in two varieties.
1. Lady Wantage.
3. Col. Cornwallis West.
3. No award.

¶ Class **125.**—3 Plants of Endive, curled leaf.
1. Rev. T. McMurdie.
2. } No award.
3. }

Class **126.**—3 Plants of Endive, broad leaf.
1. C. Duruz, Esq.
2. Lord Aldenham.
3. Rev. T. McMurdie.

Class **127.** 1 lb. of Eschalots, small, shown in clusters.
No award.

Class **128.**—1 lb. of Eschalots, large, single bulbs.
1. J. Ireland, Esq.
2. J. Huntley, Esq.
3. Mrs. Denison.

¶ Class **129.**—6 Plants Kohl Rabi.
1. Hornchurch Homes, Romford (gr. A. Higgins).
2. } No award.
3. }

* Class **130.**—6 Leeks.
1. Lord Aldenham.
2. A. A. Spiers, Esq.
3. Mr. R. A. Horspool.

¶ Class **131.**—3 Lettuce, Cabbage.
1. Mr. R. A. Horspool.
2. Rev. T. McMurdie.
3. R. Dixon, Esq., Twickenham (gr. A. H. Rickswood).

¶ Class **132.**—3 Lettuce, Cos.
1. Rev. T. McMurdie.
2. J. T. Charlesworth, Esq.
3. No award.

Class **133.**—1 lb. of Mushrooms, stalks on.
1. No award.
2. Lord Aldenham.
3. No award.

Class **134.**—6 Onions, white or yellow, round or oval.
1. Lord Aldenham.
2. A. Bramwell, Esq., Winchester (gr. J. Brown).
3. Col. The Hon. C. Harbord.

Class **135.**—6 Onions, white or yellow, flat or intermediate.
1. Lord Bolton.
2. Lady Wantage.
3. Lord Aldenham.

Class **136.**—6 Onions, red, any shape.
1. Lord Aldenham.
2. } No award.
3. }

Class **137.**—1 lb. Pickling Onions.
1. Lord Aldenham.
2. Mrs. Denison.
3. No award.

¶ Class **138.**—3 Plants Parsley, curled.
1. A. A. Spiers, Esq.
2. B. H. Hill, Esq.
3. No award.

¶ Class **139.**—3 Plants Parsley, fern leaf.
1. B. H. Hill, Esq.
2. } No award.
3. }

Class **140.**—6 Parsnips, long.
1. A. A. Spiers, Esq.
2. J. G. Marsh, Esq., Hertford.
3. Col. Cornwallis West.

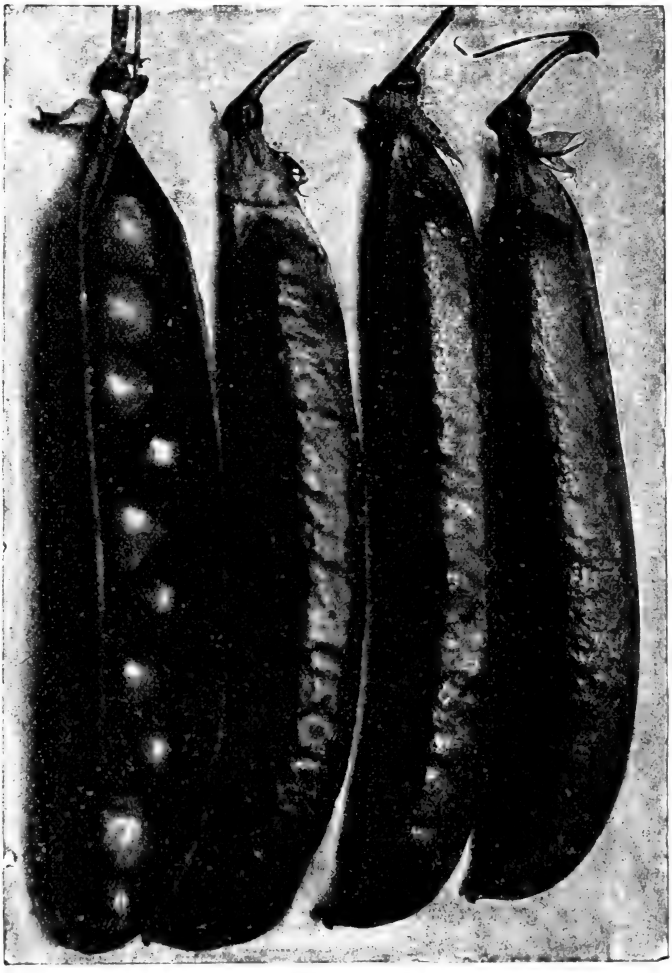


Fig. 175.—Pea 'Edwin Beckett.' (*The Garden.*)

Class **141.**—6 Parsnips, round.
No award.

Class **142.**—25 pods of Peas, one variety.
1. Lord Aldenham. (Fig. 175.)
2. Mr. R. A. Horspool.
3. J. T. Charlesworth, Esq.

Class **143.**—3 dishes of Peas, distinct (25 pods each).
First Prize, 10*s.*; Second, 7*s.*; Third, 4*s.*
1. The Earl of Lathom.
2. Mr. R. A. Horspool.
3. No award.

Class **144.**—6 dishes of Potatos, distinct (6 tubers of each), round or pebble-shaped.
First Prize, 10*s.*; Second, 7*s.*; Third, 4*s.*
1. Col. Cornwallis West.
2. A. A. Spiers, Esq.
3. No award.

Class **145.**—6 dishes of Potatos, distinct (6 tubers of each), kidney.
First Prize, 10*s.*; Second, 7*s.*; Third, 4*s.*
1. H. Padwick, Esq., Horsham (gr. J. Webb).
2. } No award.
3. }

Class **146.**—3 dishes of Potatos, distinct (6 tubers of each), round or pebble-shaped.
1. Miss Talbot.
2. } No award.
3. }

Class **147.**—3 dishes of Potatos, distinct (6 tubers of each), kidney.
1. A. A. Spiers, Esq.
3. T. Lloyd Davies, Esq.
3. Sir H. Beresford-Pierce, Bedale (gr. J. Caygill).

Class **148.**—12 plants of Salsify.
1. No award.
2. Lord Aldenham.
3. No award.

Class **149.**—12 plants of Scorzonera.
1. Rev. T. McMurdie.
2. } No award.
3. }

Class **150.**—1 lb. of Spinach.
1. } No award.
2. }
3. F. M. Brown, Esq.

Class **151.**—4 dishes of Tomatos, distinct (6 fruits of each).
First Prize, 10*s.*; Second, 7*s.*; Third, 4*s.*
1. The Earl of Lathom.
2. B. H. Hill, Esq.
3. Col. Cornwallis West.

Class **152.**—2 dishes of Tomatos, distinct (6 fruits of each).
1. J. B. Fortescue, Esq.
2. Madame Stuart, Roehampton (gr. A. Smith).
3. No award.

* Class **153.**—6 Turnips, white flesh, round.
1. Rev. T. McMurdie.
2. Mr. R. A. Horspool.
3. B. H. Hill, Esq.

* Class **154.**—6 Turnips, Jersey Navet or long.
No award.

* Class **155.**—6 Turnips, yellow fleshed.
1. B. H. Hill, Esq.
2. A. A. Spiers, Esq.
3. No award.

Class **156.**—3 Vegetable Marrows, cylindrical, white.
1. Rev. T. McMurdie.
2. } No award.
3. }

Class **157.**—3 Vegetable Marrows, cylindrical, green.
1. Rev. T. McMurdie.
2. Lord Aldenham.
3. No award.

Class **158.**—3 Vegetable Marrows, custard or round.
No entry.

Class **159.**—Collection of 9 Saladings, distinct, shown in a basket not exceeding 3 ft. in diameter.
First Prize, 10*s.*; Second, 7*s.*; Third, 4*s.*
No entry.

Class **160.**—Collection of Pot-herbs.
1. Lord Aldenham.
2. } No award.
3. }

Class **161.**—Any Vegetable not mentioned above.
1. Rev. T. McMurdie.
2. A. A. Spiers, Esq.
3. No award.

Miscellaneous Class.

Gold Medal.

To H.M. The King, Windsor Castle (gr. Mr. Mackellar), for Grapes and Pineapples.

To Messrs. Jas. Veitch & Sons, Ltd., Chelsea, for a collection of Vegetables.

To Messrs. T. Rivers & Son, Sawbridgeworth, for Fruit Trees in Pots.

To Messrs. Dobbie & Co., Rothesay, N.B., for (*a*) a collection of Potatos, (*b*) a collection of Vegetables.

Silver-gilt Knightian Medal.

To Messrs. Sutton & Sons, Reading, for Potatos.

To Messrs. H. Cannell & Sons, Swanley, for a collection of Vegetables.

Silver Knightian Medal.

To the Horticultural College, Swanley, for a collection of Vegetables.

To the Agent-General for British Columbia, Finsbury Circus, for Canadian Preserved Fruit.

To the Marquis of Exeter, Stamford (gr. Mr. Metcalfe), for Melons.

Silver Banksian Medal.

To Mr. R. W. Green, Wisbech, for Potatos.

To Messrs. J. King & Sons, Coggeshall, for Cabbages.

To Messrs. Harrison & Sons, Leicester, for a collection of Vegetables.

To Mrs. A. Bramwell, Kingsworthy, Hants, for Onions.

Horticultural Sundries.

Silver Flora Medal.

To Messrs. Bentley, Barrow-on-Humber, for horticultural sundries.

Silver Banksian Medal.

To Messrs. Wood, Wood Green, N., for horticultural sundries.

To Messrs. Corry, Finsbury Street, E.C., for horticultural sundries.

To Messrs. D. Dowel, Hammersmith, for horticultural pottery.

To Messrs. Pulham, Newman Street, W., for Pulhamite stone vases.

To Messrs. Champion, City Road, E.C., for tubs for shrubs.

To Mr. John Pinches, Camberwell, S.E., for Acme labels.

Bronze Banksian Medal.

To the Lubrose Paint Co., Moorgate Station Chambers, E.C., for horticultural paints.

To Messrs. Valls, Coleman Street, E.C., for Beetlecute.

To Mr. Jas. George, Putney, S.W., for horticultural sundries.

To Mr. J. Cannon, Ealing, W., for fruit trees.

To Mr. H. M. Hamilton, Finchley, N., for horticultural sundries.

Commended.

To Messrs. Day & Thelland, St. Helier's, Jersey, for packing-cases.

GENERAL MEETING.

October 13, 1903.

Mr. A. H. Pearson in the Chair.

Fellows elected (62).—J. Allsop, J. Ambrose, W. C. Attrill, William Barlow (South Africa), James Bell, Mrs. James Bell, Arthur Bester (South Africa), E. Blinkhorn, Mrs. C. Bowly, Sir Henry Bunbury, Miss E. M. K. Capper, Mrs. Chaloner, T. F. Chipp, Mrs. Clegg, Colonel Montagu Clementi, Mrs. Clowes, E. Collett, W. A. Cook, W. H. Cowan, George Davison, F. S. O. Deal, Charles Dennis, H. J. Dover, W. W. Duffield, A. Lamont Dugon, M. Dunston, W. Earp, Stanhope A. Forbes, Mrs. F. S. Franklin, W. Goodyear, Miss M. S. Greg, A. R. Hart, Mrs. H.

Howard, R. S. Hudson, F. W. Humphery, H. C. Knight, A. Forbes Leith, T. E. Limmer, O. H. McKenzie, H. W. Maskell, R. Milner, Mrs. B. Newgass, the Countess of Normanton, Nicholas R. Page, Captain R. J. Hall Parlby, W. Parry, J. W. Phillips, W. Pigott, N. W. Priaulx, Miss E. Ridley, Miss M. L. Ridley, C. Ogle Rogers, Rev. E. Lyon St. Aubyn, Colonel T. J. Seppings, G. S. Strode Strode, Edwin J. Stubbs, Mrs. Campbell Swinton, H. W. Symondson, H. G. Wadlow, Mrs. Somerset Webb, Mrs. Whitley, H. D. Searles-Wood.

Associates (2).—Miss D. E. E. Peto, H. J. Sadler.

Society affiliated. (1).—Godalming and District Gardeners' Mutual Improvement Association.

A lecture on "Autumn Strawberries and Raspberries" was given by Mr. James Hudson, V.M.H. (See p. 402.)

GENERAL MEETING.

October 27, 1903.

Mr. George Bunyard, V.M.H., in the Chair.

Fellows elected (30).—Major-General Abbot-Anderson, Mrs. Macclesfield Anderson, Mrs. W. D. Black, J. C. Blackgrove, Mrs. Charles Bone, Miss H. Bowden, W. Jones Brown, Mrs. Scott Browne, F. H. Chapman, F. Clipstone, Mrs. J. B. Duckworth, Mrs. Grace, H. Hewes Keddell, Mrs. Ladenburg, Major the Hon. G. Legh, Reginald B. Loder, Major C. Paynter, Charles Phipps, W. G. Quihampton, Dr. F. Ireland Rawlinson, Mrs. Richardson, A. Russ, Mrs. Sanders, F. G. Shipway, T. Skinner, J.P., F. W. Smith, Miss Agatha Thynne, Samuel Turner, Alexander Whittet, W. R. Wilson.

A paper on "Pruning Roses," by Monsieur Viviand-Morel, of Lyons, was read by the Secretary. (See p. 437.)

GENERAL MEETING.

November 10, 1903.

Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H. (President of the Society), in the Chair.

Fellows elected (45).—Charles Bathurst, Jun., W. F. Beddoes, Mrs. Bradshaw, Miss W. E. Brenchley, S. Brett (Cape Colony), Mrs. Joseph Bulkley, Mrs. Bullen, Richard Carter, Mrs. H. Cavan-Irving, F. W. Cross, Miss M. Culshaw, Colonel A. Davidson, C.B., C.V.O., Samuel C. Davidson, Lady Louisa Egerton, Mrs. G. H. Egerton Green, A. B. Evans, Walter Ewins, D. C. Guthrie, Miss E. E. Hadwen, W. Hand, Miss E. G. Hunter, Dr. Thomas Jackson, B.A., M.R.C.S., Mrs. Maitland King, Dr. A. Kutz, C. E. Levy, Mrs. J. E. McDonald, Mrs. L. O. McNaught, A. H. Marshall, Miss Mary Maud, Miss Laura Palmer, George Paterson, W. G. Rigden, Mrs. I. H. Savory, Miss A. F. Scott, Rev. G. Granville Skipwith, A. G. Stark, Mrs. R. U. Todd, Gustave Tuck, F. W. Twort, M.R.C.S.,

Miss A. M. Watts, A. S. Webb, H. Briers Wilson, Miss M. Wingfield, Mrs. H. J. Wingfield, Joseph Wintle.

A lecture on "The Advantages and Evils of Size in Flowers, Fruits, and Vegetables" was given by Mr. E. T. Cook. (See p. 407.)

GENERAL MEETING.

November 24, 1903.

Mr. Leonard Sutton, F.R.H.S., in the Chair.

Fellows elected (57).—Henry de C. Agnew, the Minister of Agriculture for British Columbia, Mrs. F. E. Arnold, Rev. Paul O. Ashby, W. Barnes, Henry Bingel, Hon. Mrs. Cecil Bingham, Thomas Blackman, James Carlton, Mrs. Moresby Chinnery, Miss Crothers, Miss L. Davison, Hon. Mrs. Henry Denison, John De Pass, His Highness Prince Frederick Duleep Singh, the Lady Emily Dyke, James Dymock, H. R. Elmhirst, Hon. Lilian Elphinstone, Mrs. Foljambe, C. Clayton Glyn, Walter Hawker, George W. Henderson, H. Grylls Hill, W. Honess, Mrs. W. H. B. Hope, David Kennington, Miss Leeming, Harry Livesey, Howard Newport (Australia), H. Handley O'Farrell, F. Menteith Ogilvie, R. Hooper Pearson, Miss B. Peel, Mrs. Perry, Hon. Mrs. Portman, Mrs. H. D. Parny Rennick, Walter B. Sadgrove, H. Waldemar Schröder, Mrs. H. Waldemar Schröder, G. Nevelle Smale, Mrs. A. Spencer, James A. Stiff, C. Stratton, Mrs. Styles, Hon. Mrs. E. Thesiger, Mrs. S. Tuke, A. Mark Walker, David Ward, W. Waygood, A. Ramsden Witham, R. D. Whitmee, Mrs. C. Wilson, Mrs. Withers, Edward Wood, J.P., D.L., J. H. Wynell-Mayow (Ceylon), Mrs. W. Younger.

GENERAL MEETING.

December 15, 1903.

Mr. Arthur W. Sutton, F.L.S., V.M.H., in the Chair.

Fellows elected (71.)—Mrs. Herbert Alcroft, Mrs. Assheton-Smith, W. J. Atkinson, Mrs. Osborne Barwell, H. G. Batten, Mrs. Sydney Beauchamp, J. Blackburne, S. Marshall Bulley, Dr. T. W. Burwood, Mrs. Cavan-Irving, the Countess of Chesterfield, Captain Spender Clay, Mrs. A. B. Collingwood, Mrs. Charles Collins, J. F. Collins, Mrs. Eales, G. Porter Eggett, George Elsom, Mrs. W. L. Ewart, Miss B. Fairbridge, Mrs. J. M. Farquharson, Mrs. Thomas Fielden, Mrs. Gordon, John J. Green, W. Hart Gregson, James Grieve, John Hallett, William H. Hammerton, Miss Harris, G. W. Harwood, Miss Hay, George Hodson (India), J. Hollingworth, Mrs. Hope, Miss Hornor, Thomas Jackson, F. Jordan, Mrs. R. W. Kennard, Mrs. R. Kinglake, Mrs. Lampen, Sydney Lee, Oscar Lipscomb, Edward Lowther, John Lyne, Richard Maurice, Arthur T. Maw, Miss Mary Montagu, William Morgan, T. Onda, Arthur R. Osman, Mrs. Wyndham Pain, Mrs. Thomas Pink, Edward D. Purvis, John

Richards, William R. Roberts, G. H. Finlay Robertson, J. Fraser Smith, Miss D. Smith-Marriott, Thomas Sproat, Joseph Thomas, Miss V. Graham Toler, George W. Tyser, Mrs. Van Raalte, Miss Alice Verner, Colonel T. E. Verner, C.B., Mrs. Harcourt Vernon, Frank Waite, E. Forster Webster, J. G. Weston, Mrs. J. Willing, Mrs. M. F. Wilson.

Societies affiliated (2).—Auckland (New Zealand) Horticultural Society. Gresford and District Rose Club.

SCIENTIFIC COMMITTEE.

JUNE 9, 1903.

Dr. M. T. MASTERS, F.R.S., in the Chair, and seven members present.

Larch, Diseased.—Mr. Massee, V.M.H., gave the following report on branches sent by Mr. Elwes, F.R.S.: "The ample material sent showed that the diseased condition was due to two distinct causes: 1. the yellow and bent leaves were caused by the aphis known as *Chermes laricis*; 2. the exudation of resin on the branches was due to the presence of the fungus called *Dasyscypha calycina* (formerly *Peziza Willkommii*). The relative immunity and susceptibility of trees growing on varying kinds of soil, and occupying different positions in a plantation, as pointed out in the letter accompanying the specimens, can only be solved after an exhaustive examination of a number of plantations, situated in different parts of the country, has been carried out. This implies field work, and cannot possibly be solved in the laboratory."

Diseased Plum trees.—Dr. M. C. Cooke, V.M.H., reported: "The fungus will be found described in the JOURN. R.H.S. vol. xxvi. p. 742, fig. 313, where its ravages are depicted as a wound parasite affecting the wood. The mature condition is *Eutypella Prunastri*, but the portions sent me only exhibit the condition of conidia known as a species of *Cytospora*. These appear on the bark of living trees. Later on, and after the wood is quite dead, the mature pustules of the *Eutypella* are developed. I have never seen the perfect fruit exhibited upon any but dead wood. It is quite akin, and closely allied to the *Valsa ambiens* of Apple-trees. I doubt whether any successful method can be adopted when trees are once attacked, but preventive measures may be used by spraying healthy trees with Bordeaux mixture, so as to kill external germs which may be lurking to find admission. When branches are seen to be attacked, it is better to prune off the branch below the infection, and burn the diseased wood, at the same time taking care to protect the wound caused by the amputation. The disease is liable to spread from tree to tree throughout an entire orchard unless some such heroic measures are adopted." See JOURN. R.H.S. xxvii. p. 691, fig. 173; Ibid. xxviii. p. 4, figs. 2 and 3.

Mangold diseased.—Mr. Massee showed pieces of roots cut up for manure. They were badly attacked by the fungus *Phoma rabifica*, which infests the Sugar Beets on the Continent. On inquiry he found that one-half of the stored roots of the "Yellow Globe" were diseased. It was the second year of the appearance of the fungus.

Larch killed by salt spray.—Mr. Massee alluded to trees some twenty-five miles inland, which were killed in the gale last March, and alluded to other instances when salt was detected on the leaves of trees from thirty to fifty miles distant from the sea. Dr. Masters mentioned the remarkable case of a Japanese Maple on Messrs. John Waterer's grounds.

The leaves on one half of the tree were killed by salt spray. In the next year that half flowered, and from the fruits abundance of seed was obtained. The Rev. W. Wilks cited an instance which occurred in his own garden at Shirley near Croydon, fully forty miles from the sea, when a particularly violent gale in early spring from the south-west incrusted the young leaves of the trees with sea salt and actually killed one plum tree recently planted and with only a few young leaves expanded. The incrustation of salt could not only be distinctly tasted, but it could be plainly seen in white crystals on the surface of the leaves.

Plants attacked by Millipedes.—Mrs. Baxter, of Doncaster, sent plants of German Asters, Stocks, &c., attacked by millipedes, upon which Mr. Saunders reported: "They are the Spotted Snake millipede *Julus guttulatus*. It is a most destructive pest in gardens, and one that is very difficult to get rid of, partly on account of the hardness of their skins, which prevents most insecticides from having any effect on them, and partly, that as they live generally below the surface of the ground, their whereabouts are not known until some plant is found injured by them. A strong solution of nitrate of soda, or common salt, is said to kill them if it can be made to reach them of a proper strength. This is not easy however, to effect, as the insecticide becomes weakened by passing through the soil. They may be trapped by burying small slices of Turnips, Mangolds, Carrots, or Potatos, or pieces of oil cake, just below the surface. It is useful to stick a small wooden skewer into each slice, so that it may be known where they are buried; it also renders them more easy to handle. These pests attack a large number of different kinds of plants, and are exceedingly fond of ripe Strawberries."

Box edging with Insects.—Mr. Saunders reported on specimens received from the Rev. H. C. Brewster, South Kelsey, Lincoln: "The insect on the Box edging is *Psylla buxi*, nearly allied to the *Aphidæ*, but is one of the *Psyllidæ*. Spraying the edging and the large bush with paraffin emulsion or some similar insecticide would be the best plan of destroying it."

SCIENTIFIC COMMITTEE, JULY 7, 1903.

Dr. M. C. COOKE, V.M.H., in the Chair, and seven members present.

Apple-trees and Insects.—Mr. Saunders reported upon specimens received from Mr. Campbell, of Ardross, Leeds: "The Apple-trees are attacked by the caterpillars of two different moths, but the habits of both are very similar. The green caterpillars are those of the Winter Moth *Cheimatobia brumata*, the brown and yellow ones of the Great Winter Moth *Hybernia defoliaria*; both belong to the family *Geometridæ*, and are two of the most destructive pests to Apple-trees. The females of both are either wingless or have only the rudiments of wings, so that they are incapable of flight. The chrysalides are formed in the ground, so that when the moths emerge, it is evident that they must climb up the trees if they wish to lay their eggs, as is their custom, near the buds. To prevent this ascent is one of the most important things to be done, if it is desired to protect the trees from attacks by the

caterpillars. The simplest way of effecting this is to fasten grease bands round the stems, which the female moths are unable to cross. As this might injure the tree if the grease came in contact with it, a strip of grease-proof paper, 7 or 8 inches wide, and long enough to overlap an inch or more, should be tied round the trees, say 3 three feet from the ground, and fastened top and bottom with bast matting or soft string that will not cut the paper. Over this should be tied a strip of calico about the same width, also tied top and bottom; this must be well smeared with cart-grease, soft soap, and train-oil mixed, so that a soft sticky compound is formed in which the moths' legs will be caught. These bands should be put into position as early as the middle of October, and kept in working order until well after Christmas. To do this the bands should be re-greased every now and then, or whenever it is found that the grease is losing its stickiness, or, as is sometimes the case, that it is clogged up with the number of moths caught in it. Notwithstanding these precautions, some of the females may find their way into the young shoots. Some are no doubt carried by the males (who fly well) when coupled, so that it is useful, when it can be carried out, to spray the trees before the buds show any signs of opening with a caustic alkali wash, made by dissolving 1 lb. of caustic soda in half a bucket of water, add $\frac{3}{4}$ lb. of pearlash, and stir until all is dissolved, then add enough soft water to make 10 gallons, and finally stir in 10 oz. of soft soap which has been melted in a little hot water. This mixture is very caustic, and must not be allowed to touch the skin or clothes, or if it does it should be wiped off as soon as possible. A still day should be chosen, so that the wind will not blow it on to the operators; this spraying should kill the eggs if any are laid on the tree. To destroy the caterpillars the trees should be sprayed, as soon as the fruit has set, with paraffin emulsion, or $\frac{1}{4}$ lb. of Paris-green and $\frac{1}{2}$ lb. of lime mixed in 50 gallons of water. This mixture must be kept well stirred, as the Paris-green is very heavy and soon sinks to the bottom, in which case some of the mixture will be too weak to kill the caterpillars, and the rest so strong that the foliage will be injured."

Lilac Shoots and Frost.—Mr. Massee, V.M.H., showed a curious and important effect of frost on the leaves of the Lilac. The apex was frost-bitten, then, after a thaw, the leaf became attacked by *Botrytis cinerea*, which travelled down the region of the midrib and petiole, till it attacked the terminal bud between the leaves. As thousands of flower buds were thus destroyed in consequence of the late frost, great pecuniary loss accrued to the growers for the flower markets.

Scientific Committee, July 21, 1903.

Dr. M. T. Masters, F.R.S., in the Chair, with eight members present, and Mr. Hunt from New Zealand, visitor.

Verbascum leaves diseased.—Dr. Cooke, V.M.H., reported on leaves brought by Mr. Holmes:—"The white mould on the under surface of the leaves of *Verbascum* is a well-known British species called *Oidium Balsamii*. It occurs not only on leaves of *Verbascum*, but also on the

leaves of Turnip, and, singularly enough, on the fruit of cultivated Strawberries. In the latter case it is destructive, without there being any safe remedy. The conidia are formed from joints of the erect threads, as in *Oidium Tuckeri*, but are very characteristic, being truncate at the ends and barrel-shaped. The only remedy is powdered sulphur."

Gooseberry disease.—Dr. Cooke reported upon specimens sent by Mr. Rogers of Launceston: "It is apparently not *Sphærotheca mors uvæ*, but another Gooseberry parasite, not quite so bad, viz. *Microsphæra grossulariæ*. The conidia are very similar. Treatment is the same, viz. powdered sulphur (flowers of sulphur)."

Strawberry with Slime fungus.—Dr. Cooke reported upon Strawberries sent by Miss A. Williams of Ty-Mawr, Brecon: "The Strawberry plants are in no way diseased. The curious grey organism, about the size of a Strawberry, is a cluster of the common and well-known slime fungus, or Myxogaster, called *Spumaria alba*. It has been found on grass, leaves, twigs, and all manner of substances indiscriminately, and is entirely independent of the matrix upon which it is developed. It is strange that it should have been seen in three or four instances on parts of Strawberry plants, and possibly, if sought after, it would be found in the same neighbourhood on quite different substances. Not being a disease, but merely an accidental interloper, there is nothing to be said about a remedy. If it should become a nuisance in the locality, that must be disinfected, and probably lime would effect this most satisfactorily."

Mammillaria attacked by Cuscuta.—Prof. Boulger reported upon a specimen sent by Mr. J. Evans of Matlock Bath: "Having examined the seedling plant of *Mammillaria potosiana*, with the kind assistance of Dr. Rendle, the structure proves to be undoubtedly a *Cuscuta*, which has penetrated and spread from one to the other of all the individuals present. Haustoria were clearly visible, but in the absence of any flower it was not possible to determine the species. It may, very probably, be a British one introduced with the soil used in potting; but Mrs. Boulger informs me that the hedgerow Cacti in the environs of Monte Video were commonly entangled together by a mass of red thread-like stems."

Ceropegia, species of.—Mr. Odell showed blossoms of *C. stapeliæformis*, *C. Sandersoni*, and *C. Woodii*, and called attention to the freely oscillating hairs on the margins of the corolla. This is due to the hair being club-shaped, but terminating below in a fine point by which it is attached.

Aloysia with alternate leaves.—Mr. Odell also exhibited a stem in which the usual whorls of three leaves were replaced by alternate leaves. Prof. Henslow, V.M.H., observed that when this was the case, as on the Jerusalem Artichoke, it usually gave rise to the spiral represented by $\frac{2}{7}$, of the series $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{7}$, &c.

Pollination in Orchards.—The following communication was received from Mr. Chittenden, of the County Laboratories, Chelmsford:—"The experiments commenced last year (see JOURN. R.H.S. xxvii. p. cxc) in order to discover which varieties of Apple and which of Pear are self-fertile, *i.e.*

will produce fruit with the aid of their own pollen alone, and which are self-sterile, *i.e.* will not produce fruit without the aid of other than their own pollen, were continued during the present season.

"The following varieties of Pear were experimented with :—'Bellissime d'Hiver,' 'Beurré d'Amanlis,' 'Beurré Superfin,' 'Catillac,' 'Conference,' 'Durondeau,' 'Easter Beurré,' 'Emile d'Heyst,' 'Louise Bonne of Jersey,' 'Pitmaston Duchess,' and 'William's Bon Chrétien.' Of these 'Conference' and 'Durondeau' set fruit abundantly, confirming the positive results obtained with these varieties last year, and proving beyond doubt their self-fertility; 'Bellissime d'Hiver' and 'Pitmaston,' neither of which set fruit last year, each this season set one out of eighteen and twelve flowers respectively, showing the possibility of the self-fertility of these two varieties; none of the other seven varieties set fruit at all with their own pollen.

"The varieties of Apple tested were 'Beauty of Kent,' 'Bismarck,' 'Bramley's Seedling,' 'Cellini,' 'Claygate Pearmain,' 'Cox's Orange,' 'Dumelow's Seedling,' 'Ecklinville,' 'Gladstone,' 'King of the Pippins,' 'Lane's Prince Albert,' 'Lord Derby,' 'Lady Sudely,' 'Mannington Pearmain,' 'Newton Wonder,' 'Northern Greening,' 'Peasgood's Nonsuch,' 'Royal Jubilee,' 'Sandringham,' 'Schoolmaster,' 'Stirling Castle,' 'Sturmer Pippin,' and 'Worcester Pearmain.' The two varieties which last year set fruit under conditions precluding the entrance of foreign pollen were 'Gladstone' and 'Stirling Castle,' and each of these again set fruit under similar conditions, thus confirming last year's result. Of the other varieties which did not set fruit last year 'Lord Derby' and 'Schoolmaster' gave positive results, all the other varieties producing no fruit under these conditions, while of the varieties tried this year for the first time, 'Bismarck,' 'Bramley's Seedling,' 'Dumelow's Seedling,' 'Ecklinville,' 'King of the Pippins,' 'Lane's Prince Albert,' 'Newton Wonder,' 'Peasgood's Nonsuch,' 'Royal Jubilee,' and 'Worcester Pearmain,' only 'King of the Pippins' set fruit with its own pollen only. The Pear flowers were bagged on March 31 and April 2, and the Apple flowers on May 7 and 13. This will give the dates when the flowers were about ready to open. Manilla paper bags were used, not muslin, as I think these ensure greater protection and cut off very little more light—quite sufficient is allowed to pass through for the proper development of chlorophyll."

Carnation roots.—Samples were sent by Mrs. Duncombe of North Drighton Manor, Wetherby, who described the plants as "growing in a newly made bed, entirely outside; and the same affection has occurred for many years. The soil is dry, in a high and walled garden."

Mr. James Douglas, V.M.H., reported: "There is no disease on the Carnations sent. The roots have died from some cause, but it is not possible to say what it is without being on the spot. The same result ensues from too little or too much water. It occurs on pot-plants when watering has been neglected, and a rush of water subsequently given will kill the roots. There are also some varieties so degenerated or debilitated in constitution that the effort to produce flowers is too much for them, and they get into the state of those sent. I would advise procuring some vigorous-growing varieties, or a new stock. Mortar rubbish in the soil is

good; bone dust also gives vigour to Carnations. I have also used ground oyster shells with the best results."

Papaver dubium, semi-double.—Rev. W. Wilks showed a small plant of this species found wild in a semi-double condition. As the entire plant was about 5 inches high, and the blossom 1 inch in diameter, the "doubling" was probably a result of starvation, a not infrequent cause.

Conference in New Zealand.—Mr. Hunt gave some account of the Conference in New Zealand upon fruit-growing and horticulture; and an interesting discussion followed upon plants of New Zealand desirable for cultivation in England, in which Canon Ellacombe, Dr. Masters, and others took part.

Scientific Committee, August 4, 1903.

Dr. M. T. Masters, F.R.S., in the Chair, and six members present.

Late-flowering Plums, &c.—Mr. Hooper had noticed that various modifications occurred in the flowers of fruit trees at the present time. Petaloid sepals and semi-doubling of petals with two carpels, forming twin Plums, were not uncommon. It was observed that in the common cultivated double Cherry there are always two foliaceous carpels present. Pear trees, &c., have also produced a second crop of flowers, which are borne on the ends of the young shoots instead of on spurs.

New Crocus.—Mr. Bowles exhibited dried specimens and drawings of *C. caspius* from Russian Talych, S.W. Caspian, with a white flower tinted with rose. He also showed the autumn-flowering *C. Scharojani* from the Caucasus. It is of an orange colour, and carries the leaves of the last season simultaneously.

Papaver pavoninum.—Mr. Wilks showed a plant from Central Asia remarkable for a crescent-shaped black band near the base of each petal (see *Gartenflora*, 1882, p. 290, t. 1095).

Cucumber diseased.—Mr. Davis, of Bitton, Bristol, sent roots and leaves of Cucumbers which had failed. Mr. Saunders reported: "I found that the extreme base of the stem was attacked by small worms belonging to the family *Enchytracidæ*, which are nearly related to the earthworms, and are well-known pests at the roots of plants; they were undoubtedly the cause of the unhealthiness of the plants. Lime water will kill them in a few minutes if it can be made to reach them; thoroughly drenching the soil with this fluid might be of use, though I do not know what effect it might have on the plants. The present specimens, however, are so injured, that I should imagine the best thing to do would be to pull them up and burn them, and burn or bury deeply the soil in which they grew. I have carefully examined the leaves, and could not find that there was anything amiss with them except that they were attacked by aphides. However, the worms at the base of the stems were quite enough to account for the decay of the plants, and the injury caused by the aphides would be comparatively trifling."

New Cucumber Disease.—Dr. Cooke, V.M.H., reported upon some fruit badly attacked received from the neighbourhood of Bristol: "The disease has made its appearance upon mature fruits, and threatens to

occasion great loss, as it is not confined to a specimen or two here and there, but appears to be spreading over the whole crop. The disease forms dark depressed spots on the surface of the fruits in the first instance, which gradually enlarge and expand until they become quite black and convex like nodules, and crack either around or across, exposing the pale under-stratum. At first they are about a quarter or half an inch across, and finally extend to an inch or 2 inches, or become confluent. The surface is from the first mealy with the conidia, which are afterwards profuse, mixed with slender hyphæ, so as to impart a grey velvety appearance. The earliest conidia are more nearly globose than afterwards, from $10 \times 8\mu$ to $12 \times 8\mu$; becoming at length as much as $25 \times 8\mu$, and then usually uniseptate, but with scarcely any colour; occasionally two or three conidia are concatenate. The hyphæ are long and slender, half or two-thirds the diameter of the conidia, septate, simple, not constricted or nodulose, of a pale smoky colour, and very sparse in comparison to the conidia. The flesh of the fruit beneath the spots turns of a golden or tawny brown. The black elevated spots resemble large scabs, and the parasite which apparently causes the mischief has been called provisionally *Cladosporium scabies* (Cooke). But it is still under cultivation and observation in order to investigate its life-history. The mould is closely allied to the *Cladosporium* which attacks the leaves of the Tomato, but the black blotches resemble those of the *Macrosporium* on the Tomato fruits, except that they are not shining. It is strongly recommended that all diseased fruits be removed and destroyed at once, and those remaining should be sprayed to preserve them from attack. Condy's fluid (dilute) should be tried, as less likely to injure the fruits than copper solutions. Anyway, no effort should be spared at once to stamp out the pest."

Scientific Committee, August 18, 1903.

Dr. M. C. Cooke, V.M.H., in the Chair, and nine members present.

Orites excelsa.—Mr. E. M. Holmes exhibited a specimen of the bark of *Orites excelsa*, R. Br., containing aluminium succinate deposited in cavities and natural fissures. Hitherto only traces of aluminium have been found in phanerogams, although not infrequent in cryptogams, but in this proteaceous tree it occurs in even greater abundance than in any of the cryptogams. The specimen was sent by Mr. H. G. Smith, of the Technological Museum, Sydney, who has given details of his discovery to the Royal Society of New South Wales.

Rubus rosæfolius.—Mr. Odell showed flowers and fruit of this *Rubus*, which has pinnate foliage of a light green colour, white flowers, and scarlet fruit.

Proliferous Cucumber.—Dr. Masters, F.R.S., showed a remarkable specimen, in which from one fruit a second one had sprung, longer than the first. This was from a specimen probably akin to those showing remarkable outgrowths of flowers from the axial part of the fruit, exhibited on a former occasion. (See Journal R.H.S. xxvi. p. cxxxii.)

Hymenocallis Harrisiana.—Mr. Bliss, Orpington, sent bulbiform seeds

of this plant in process of germination, with the following remarks: "It will be seen, as I stated in the communication I sent in June, that more than one cotyledon issues from some, if not from all, of the 'seeds' or fruits, and on dissection more than one embryo or ovule will be seen.

"The nine 'seeds' I sowed last year produced respectively 1, 2, 2, 3, 3, 4, 4, 4, and 6 bulbs, some of which came up much later than others. It is possible that some of these might be offsets, something like Tulip 'droppers,' but on taking them up there was no sign of there having been any connection between them. The three one-year-old bulbs enclosed came from one 'seed' (which had four bulbs altogether).

"I think it may also be noted that though the cotyledons begin to grow within the fruit in various directions, as you will see on dissection, they all eventually issue from the underside of the fruit as it lies on the soil, irrespective of the position of the fruit itself, for they were purposely placed with different sides downwards.

"The ovules within the fruit do not germinate simultaneously, and there is apparently competition between them for the substance of the fruit; the ones that germinate first apparently produce larger bulbs than the later ones.

"I think it will also be seen that the tip of the cotyledon is a true root. This is apparent even when the cotyledon is only $\frac{1}{8}$ in. outside the fruit; when it is from about $\frac{1}{4}$ to $\frac{3}{4}$ in. long it develops a little tuft of bristles or root-hairs at the junction of the neck of the cotyledon and the root, by means of which it anchors itself in the soil, and then the root grows on downwards. This takes place when the soil is kept moderately moist, but I suspect that if the soil were drier the cotyledon would extend itself more before anchoring and sending down the root.

"That the process issuing from the fruit is a true cotyledon is more apparent at a later stage, when the lower part has thickened into a bulb and the tissue of the fruit all been absorbed by the young seedling. Then if the semi-withered, semi-rotted upper part of it (coiled or doubled up inside the remains of the fruit) is dissected away, the dormant plumule will be seen issuing from the centre of the fresh, somewhat thickened part left.

"I have no doubt you will observe this and more with the seeds I send you, but I will also send some more for the committee to see when in this later stage.

"I have a *Himantophyllum* seed which has produced two seedlings (now in their first leaf and both still connected to the seed). This seems to me to be more possibly a case of two embryos in one seed, but my further observations this year have strengthened my conviction that with *Hymenocallis Harrisiana* it is a case of several seeds or ovules in a modified pod—or fruit."

Dr. Rendle reported on this communication: "The 'seeds' of *Hymenocallis Harrisiana*, from which several seedlings are growing, and which Mr. Bliss suggests are 'several seeds or ovules in a modified fruit,' are an example of the bulbiform type of seed frequent in *Amaryllidaceæ*. They are polyembryonic, but in the advanced stage of development which they have reached it is impossible to suggest how the polyembryony has arisen in the seed.

"As regards the individual seedlings, they conform to a very common type of germination among monocotyledons. The radicle is pushed out by the lengthening cotyledon and grows downwards to fix the plant in the soil. The cotyledon also elongates, following the growth of the radicle, but its coiled end remains in the seed to absorb the foodstuff. The limiting line between base of cotyledonary sheath and the radicle is very well marked; the hypocotyl is suppressed.

"The seeds apparently belong to the first type of bulbiform seed to which I refer in my paper in the Society's JOURNAL (xxvi. [1901], pp. 89–96), i.e. they are true seeds, the outer integument of which becomes thick and fleshy after fertilisation."

Apple-tree, Scorched.—A letter was read from Mr. Dowson relating to the bark peeling from one side of young apple trees. The dead bark does not peel off on the south side only, as it would do from sun-scorch, to which the mischief has been attributed, but on the north side also. Lightning was suggested as the probable source of injury, as no fungus could be detected.

Cucumber Scab (*Cladosporium scabies*, Cooke).—Dr. Cooke, V.M.H., said: "Since reporting on Cucumber Scab, I have received examples in an earlier stage from Hillingdon. In these the spots or scabs are not blackened, but smaller and somewhat depressed, and of a grey colour, and velvety from the mould which covers them. Each spot has, in this case, an amber-coloured tear, or exudation of gum, and in some cases two or three from the same scab. This gummy matter is hardened, and can only be partially dissolved with difficulty. In so far as I have been able to ascertain hitherto, this is a purely gummy matter, without organisation. No cells or sporules of any kind could be found. It suggests that the earliest manifestation of disease may be an exudation of gum, and this might be an effort of the plant to cast off the parasite by the formation of a gummy matter at the point of irritation. Some of the spots, however, exhibit no trace of gummy exudation, but in all cases the *Cladosporium* is present."

A close atmosphere is favourable to *Cladosporium*, while a current of air is destructive. The above shows clearly that the blackness or convexity of the cuticle is *not* an essential of the parasite.

Peas.—Mr. Worsley showed specimens of late Peas rotting near the base, while the foliage above turns brown and shrivels. This condition is very common this autumn, and is probably due to the excessive moisture at the root.

SCIENTIFIC COMMITTEE, SEPTEMBER 1, 1903.

Dr. COOKE, V.M.H., in the Chair, with six members present, and Mr. A. Gaut, visitor.

Hippeastrum species.—Col. Tillotson sent flowers of a plant from South America. The petals were of a pale clear green, passing into primrose, the stamens and pistil bright pink, and protruding far beyond the petals, which were almost closed at the apex of the flower. Though not very attractive in colour, it was thought it might be useful to breed from, on account of the great substance of the petals.

Raspberry, Wineberry, Blackberry Hybrids.—Mr. H. Peerman sent specimens of the foliage (the fruits had fallen off, and could not be identified) of three hybrids, Blackberry × Raspberry, Raspberry × Wineberry, Wineberry × Raspberry. They were considered most interesting, and he was requested to send them again next year, each in a separate box, with both fruit and foliage.

Bud Formation.—Mr. J. Robson sent "a section from a young Sycamore exhibiting the extraordinary facility with which this tree develops woodbuds from the bark." The tree had been budded on the bare space between two leaves, and the bud had failed, but from the base of the incision the stock had sent out a growth "where no eye previously existed. I have twenty-five or more examples of the same thing in Sycamores, but though I have budded many subjects I have never noticed it in any other genus."

Hippeastrum Blistered.—Dr. Bonavia sent some leaves of *Hippeastrum* "covered with something that looks like scale, but which adheres so closely to the epidermis that it is difficult to remove." The scalelike blotches, on examination, proved to be not of insect formation at all, but blisters due probably to defective root-action, itself due to a check of some sort, such as cold or too much wet.

Cryptococcus on Weymouth Pine.—Mr. R. Knight-Bruce sent a specimen of bark literally swarming with the white woolly or waxy *Cryptococcus* which attacks Pines, and which, he says, is rapidly spreading, and killing plantations of the Weymouth Pine. The Committee considered the case almost hopeless, but suggested spraying the trees with a paraffin emulsion. Rev. W. Wilks said he had but little hope in spraying *Cryptococcus*, as, unless the sprayer was peculiarly strong and powerful, the liquid would not penetrate the downy wax with which the insect covers itself. He had known a case of a Beech-tree being saved by hand scrubbing with a brush, using soft soap and paraffin emulsion, but he had never known spraying to be successful.

Discoloured Vine-leaves.—These were received from Mr. Neild, of Holmes Chapel. Dr. Cooke reports: "Vine-leaves with broad irregular patches of bright coloration have been known and observed for the past half-century. Sometimes the colour is yellow or becoming brown, and sometimes reddish or claret colour. In America it is known as the Californian Vine disease (see U.S.A. Dep. Agr., Div. Veg. Pathol. Bull. n. 2, 1892). This or a similar disease is known in Sicily as 'Folletage,' and in Italy as 'Mal nero.' No satisfactory reason has yet been assigned for this affection, as no trace of fungus has been found, and there is no cause to suspect that fungi of any kind have anything to do with the discoloration. Leaves are constantly being submitted to the Scientific Committee for report as to the cause or remedy, but none can be given."

Floriferous Sweet Pea.—Mr. Hunt sent a flower-stalk of Sweet Pea having seven fine blossoms.

Proliferous Helenium.—The Rev. C. Wolley-Dod, V.M.H., sent flower-heads of this, remarking that one particular plant in his garden always produces them; and that, as a rule, small secondary flowers grow out of the disc.

Campanula lactiflora, linear-leaved.—The Rev. C. Wolley-Dod sent a

curious "abnormal" form of *C. lactiflora*, "which comes in small percentage from the seed of the typical form, perhaps one in 200. The linear leaves can be recognised early in the seedling stage, and I never saw intermediate forms." Analogous forms with stellate flowers are not uncommon in *C. rotundifolia*, and De Candolle in his monograph of *Campanula* figures and describes one on *C. Medium*, which he considered unique in the genus.

Silver-leaf Disease in Apples and Plums.—Mr. Gaut brought specimens from an orchard of 7 acres in Yorkshire. The soil is warp-land, varying in depth from 1 to 3 feet within short distances, and overlying clay. The drainage is good, with drain-pipes. Shelter is afforded by the fruit-trees in the orchard. The altitude is nearly sea-level. The general culture has been to give a good dressing of farmyard-manure every four years, and lime every few years. The trees had been planted ten years, and silver-leaf appeared three years ago, and is becoming worse every year. The trees affected in summer die the following year. The varieties affected are 'Victoria' Plums, of which there are about 500 trees, and 'Lord Grosvenor' Apple grafted on 'Keswick Codlin' stock. The matter was creating considerable interest in Yorkshire, and the soil had been analysed with the following result:

The air-dried soil contains in 100 *parts*—

Water	3·10 per cent.
Loss on ignition (organic matter, combined water, &c.)	5·09 „
Mineral matter	91·81 „
	100·00

Containing nitrogen	0·151 per cent.
Equal to ammonia	0·183 „

The soil was free from root fibres or any visible organic material.

It had been said by some experts that silver-leaf was due to a lack of nitrogen in the soil, but the analysis seemed to show this could hardly be the cause (see correction on page clxxiv).

Dr. Cooke, V.M.H., said that the disease was so mysterious because he could find no spores or mycelium of fungus and no bacteria. He knew of no remedy, but advised cutting out the parts affected the moment the disease was seen and burning them. See JOURN. R.H.S. vol. xxvii. pp. 713, cxliii, and cxlix.

Rose-leaves diseased.—Mr. J. W. Scott sent three bundles of Rose-leaves diseased. "No. 1. The plants are in good health, and at present there is but very little of the disease on them. No. 2 is taken from small pot plants spring-grafted, which seem to develop these spots when grown in a highly moist temperature. No. 3 appears to be like the last, attacking plants that are in a soft-growth, and we have it in several houses, in some cases stripping every leaf off the stem, but on taking the lights or glass off, the plants recover to a great extent."

Dr. Cooke pronounced the disease in each case to be *Actinonema rosæ*,

called by growers the Black Mildew. It is a fungous disease very common all over Europe, and though it may be checked by Bordeaux mixture, no actual remedy is known. It was considered to be greatly stimulated and encouraged by growing the plants too closely together without sufficient air and light, or in too humid an atmosphere. It is advised to dry the plants off, letting all the leaves fall (which should be collected and burnt), and then induce them to make altogether fresh growth.

Grubs on Cherry-tree Leaves.—Mrs. Knight, Lower Hartlip, reported considerable damage done by small black grubs of which she enclosed specimens.

Mr. Saunders said: "The grubs are those of one of the sawflies (*Eriocampa limacina*). They are commonly known as 'Slug-worms,' I suppose because they are neither slugs nor worms; they certainly, however, resemble the former. Powdered Hellebore dusted over the leaves is very efficacious, but it is a very poisonous article to use, and finely powdered freshly slaked lime is just as good; spraying with 'paraffin emulsion' is very effective, and so is a solution of soft soap, and quassia extract. Whichever of these remedies is used, it should be repeated after an interval of a day, as the grubs have the power of casting off the slimy matter with which they are covered, consequently the insecticide is thrown off too, and another application should be made before the insect's fresh coat is fully developed, and the power of throwing it off regained. Spraying with Paris-green, 1lb. mixed with 180 gallons of water, is very useful, as it renders the leaves poisonous; the mixture should be kept well stirred, as the Paris-green quickly settles to the bottom on account of its weight. As it is a violent poison, care must be taken in using this remedy. When the grubs are full-grown they fall to the ground, and bury themselves some two or perhaps three inches below the surface, each forming a papery cocoon round itself, within which it turns into a chrysalis. If the surface soil is skimmed off so as to remove the cocoons, and is then burnt, buried deeply, or thrown where poultry can pick it over, the trees should be free from the pest next season, unless they are infested by the parent sawflies, which may have been bred in a neighbour's garden or orchard. If there was some co-operation between gardeners in the matter of destroying insect pests, many might soon be stamped out, for several years at least."

Scientific Committee, September 15, 1903.

Mr. A. D. Michael, F.L.S., in the Chair, and six members present.

Silver-leaf Disease.—With reference to the report in the minutes of the last meeting, Mr. Gaut wrote as follows: "I notice a slight error. It is this, 'Silver-leaf was due to a *lack* of nitrogen in the soil.' It should have been 'Silver-leaf was due to the presence of too much nitrogen in the soil.' Mr. Bland, the owner of the affected fruit trees, before he wrote to me, sent some leaves to the Board of Agriculture, who sent them on to Mr. Massee. The following is a copy of the report:—'Copy A, 3350.—Diseased Plum trees.—The disease is generally known

as Silver-leaf, and has been proved to be due to the presence of too much nitrogenous food in the soil. Abstain from using farmyard or organic manure of any kind, and sow rape or some quickly growing crop under the trees. Remove the crop when fully grown.'" Much hesitation was shown by the Committee in accepting this conclusion, as Portugal Laurels growing in poor gravelly soil and never manured have been known to be as badly affected as garden fruit trees.

Asparagus diseased.—Herr Otto Froebel, Zürich, sent the following communication, with specimens:—"Permit me to send you to-day by post a monstrosity I have observed since last year on my old plant of *Asparagus retrofractus*. We call such form 'Hexenbesen,' which means 'Witch's broom.' They are often observed on different hardy plants, on conifers, trees, and shrubs. However, I have never observed this anomaly on any one of my various species of *Asparagus*, and I hope it will be interesting to the readers of the JOURN. R.H.S. if you will bring this to their notice." Mr. Michael undertook to examine the specimen. "I intend to send you next spring a flowering branch of the quite new *Forsythia europæa* (Deegen and Baldacci), introduced by seeds in 1899 from Albania. I should feel much satisfied if I could send the first flowering branches of this new shrub, very hardy in my country, and if this novelty could be figured in your very fine and always most interesting JOURNAL."

Chimonanthus, abnormal foliage.—Mr. Odell showed branches bearing normal as well as bifurcated leaves, arising from a separation of the fibro-vascular bundles of the midrib, at various distances from the base. In some it commenced even in the short petiole.

Eelworm in Agrostis.—Mr. Chittenden showed examples of the unusual position of eelworms in the inflorescence of this grass.

Ceoma in Campanula.—Mr. Chittenden showed examples of this fungus in *C. rapunculoides*, as well as an apparently new species of fungus attacking the sepals of *Clematis*.

Dracæna with Aërial Root.—Mr. Chittenden also exhibited a stem which had been ringed, and had since produced a downward-growing "toe," or adventitious root, more than a foot above the ground.

Tolmiea Menziesii.—Rev. W. Wilks received a plant in foliage, on every leaf of which a foliaceous bud was developed at the base of the blade on the upper end of the petiole. This peculiarity is mentioned in Bailey's "Cyclopedia of American Horticulture" in the following words: "propagates naturally by adventitious buds, produced at the apex of the petioles of the radical leaves, and rooting when these fall to the ground." This plant has been described under the names of *Heuchera Menziesii* and *Tiarella Menziesii*, but the above name is now the correct one.

Figs drying and falling.—Mr. Worsley drew attention to the fact that certain Figs frequently ceased to mature after a certain time, then dried up and fell off. The general opinion was that nourishment was diverted by some cause or another, as the winter Figs in this country always fall off as soon as foliage appears.

SCIENTIFIC COMMITTEE, OCTOBER 13, 1903.

Dr. M. T. MASTERS, F.R.S., in the Chair, and nine members present.

Male Figs.—Dr. Masters observed that several instances of Figs which had failed to ripen had been sent to him. They were remarkable for containing entirely male flowers; ordinary Figs being entirely female, but ripening without fertilisation, except in the case of the Smyrna Figs, which require "caprification."

Potato Disease.—Dr. Cooke, V.M.H., replied to inquiries as to the transmission of the mycelium from the leaves down the stem being the only means of reaching the tuber:

"Attention has been called to the Potato disease, and the transmission of the mycelium from the leaves down the stem to the tubers, the question being raised whether this is the only way in which the disease reaches the tubers. It has been suggested that according to this theory the disease would first appear in the tubers at the point where it is connected with the stem by means of the threadlike offshoots, and it is stated that as a result of examination it was found that the tubers were diseased only on the end opposite to that by which they were connected with the stem, and in some cases it only penetrated the outer skin. This raises the pertinent inquiry whether the tuber may not contract disease from active spores in the soil, without connection with the surface portion of the plant.

"To this I may add that I have seen similar instances, and that it is my own individual opinion that the disease may be communicated direct to the tubers while young and with a delicate skin or when bruised or wounded, by contact with active conidia or zoospores washed down from the surface of the soil, and that the mode in which some tubers are attacked can only be explained by this hypothesis."

Clematis Parasite.—Dr. Cooke also reported on a new disease: "Specimens sent by Mr. Chittenden from Chelmsford of a new parasitic mould on the sepals of one of the forms of *Clematis Jackmanni*, deserves to be reported upon, as it may occur again in other places. It has been called by Mr. Chittenden *Ovularia clematidis*, and I agree with his determination. (Fig. 176.)

"The spots are epiphyllous, white, conspicuous, circular or subcircular, 2–4 or 5 c.m. diameter. Mycelium colourless, branched, creeping. Fertile hyphæ erect simple, 40–60 × 7μ, bi- or triseptate. Conidia hyaline, solitary, continuous, elliptically cylindrical, rounded at the ends, 28–42 × 14–16μ, smooth.

"At present no experiments have been made to check this parasite, and it is quite uncertain whether it will establish itself, but, if it should do so, it would be well to try powdered sulphur at first, and, if this is not successful, to fall back upon Bordeaux mixture."

Vegetable Monstrosities.—Mr. Worsdell exhibited a spray of *Pelargonium* with foliaceous bracts at the base of the umbel, and a fasciated peduncle; also flower-heads of *Scabiosa atropurpurea* with proliferous axis. Mr. Wilks observed that this is particularly common on plants grown from German seed.

Lilac injured by Insects.—Mr. Gordon, V.M.H., showed branches attacked by some insect, on which Mr. Saunders reported as follows :—

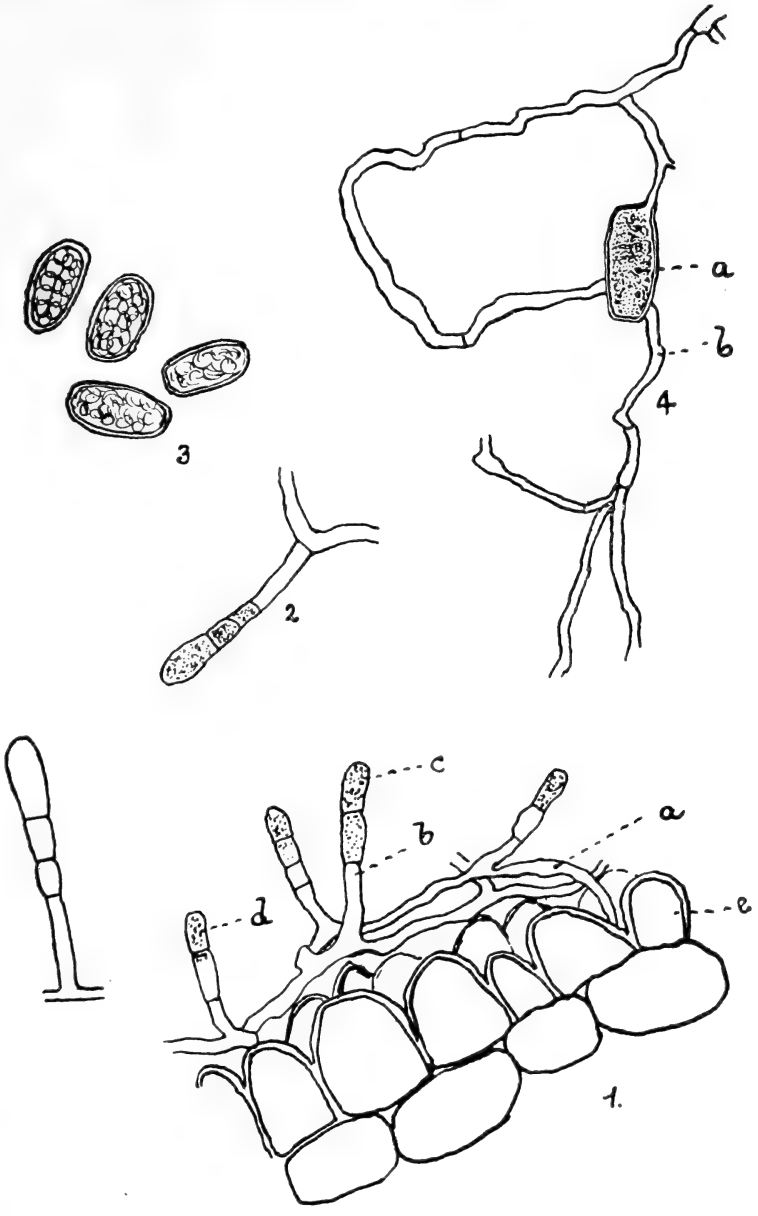


Fig. 176.—Ovularia clematidis on Clematis.

1. Section of petal with mycelium (*a*) and conidiophores (*b*, *c*, *d*). 2. Conidiophore with conidia. 3. Conidia × 400. 4. Conidium (*a*) germinating (*b*).

"The Lilac-leaves were injured by the caterpillars of a small moth, one of the *Tineina*. The caterpillars had taken their departure from the leaves, and had no doubt buried themselves in the ground beneath the bush and

become chrysalides within a couple of inches of the surface. I should recommend that a good dressing of kainit should be given, and that it should be chopped in with a hoe; this would probably kill a number of them. When the leaves are opening in the spring another dressing would be useful to prevent the moths making their way to the surface."

Warty Disease of Potatos.—Mr. Gordon exhibited Potatos badly attacked by *Chrysophlyctis endobiotica* (see *Journ. Bd. Agr.* ix. pp. 320–323; and JOURN. *R.H.S.* xxvii. p. 1180). This fungus was introduced from the Continent, and first appeared in Cheshire. It has completely destroyed crops in allotments this year in Nottinghamshire.

Prof. M. C. Potter, in *Journ. Bd. Agr.* ix. p. 322, writes as follows:—"As, so far, it appears to be of local occurrence, it is of the highest importance to stamp it out before it obtains a firm foothold in this country. This might be done by carefully sorting the Potatos and destroying those attacked. These should in no case be allowed to pass out of an infected district or be used for 'seed.' It is worth taking every possible precaution to check this parasite, which otherwise might ensure for itself a wide distribution and cause very considerable damage."

With reference to this disease Dr. Cooke, V.M.H., writes:

"This new disease appears to have been first recognised in specimens from Cheshire in 1900, afterwards to have been sent from North Wales, and more recently from other localities. It attacks the tubers whilst in the ground, causing warty or nodular outgrowths, either partially or wholly investing the young tubers. Just beneath the surface of these protuberances, the outer layers are filled with nearly globose dark brown sporangia, about 60 to 70 by 50μ.

"It has been assumed that this fungus is the same as was described under the name of *Chrysophlyctis endobiotica* by Schilbersky (*Ber. d. Deut. Bot. Ges.* xiv., 1896), but no figures or measurements were included in the original description.

"A similar disease attacked Beetroot in the grounds of the School of Agriculture at Rouiba (Algiers), and this Trabut examined in 1894, and described under the name of *Œdomyces leproides*. This was afterwards examined by Dr. Magnus, of Berlin, and he applied to it the name of *Urophlyctis leproides*. At any rate, it is quite certain that Dr. Magnus was acquainted with the Beetroot tumour, and we are assured that upon his examination of specimens of this warty Potato disease, sent to him from this country, he has pronounced it to be identical with the Beetroot tumour, and therefore should be called *Œdomyces leproides*. No one could call in question the authority of so old and experienced a mycologist as Dr. Magnus; and when it is taken into account that he has personally been made acquainted with both forms of disease, on Beetroot and on Potato, it is rather presumptuous, without better evidence than a description without figures or measurements, to call in question his decision. At present, therefore, we are content to accept the view adopted by Dr. Magnus, that the Beetroot tumour and the warty Potato disease are produced by the same fungus, for which the accepted designation is *Œdomyces leproides*.

"Of one thing we may be quite certain, that this threatens to become a troublesome disease unless heroic measures are undertaken to stamp it

out, and especially by taking care not to plant Potatos again on ground where warted Potatos have been found, until the soil has been thoroughly disinfected, and then to cultivate some other crop for two or three years. If the Colorado *Rhizoctonia* finds its way to us across the Atlantic, our Potato crops will be in grave danger from two such powerful enemies."

Dr. Magnus, however, sent a note to the "Gardeners' Chronicle" saying: "Dr. Cooke is mistaken in thinking that I have identified the fungus in the warts of the Potatos as *Urophlyctis leproides* (Trab.), P. Magnus, which causes the Beetroot tumours. I have never seen the warty Potatos, which I regret very much, and of course I have written nothing about them. But the description given by R. Schilberszky in *Berichte der Deutschen Botanischen Gesellschaft*, vol. xiv. (1896), pp. 36, 37; and the description and figures given by Mr. M. C. Potter in the *Journal of the Board of Agriculture*, vol. ix., December 1902, p. 320, plate iv., seem to me to show that the fungus of the warty Potato-disease is entirely different from *Urophlyctis leproides* (Trab.) in the Beetroot tumours, and belongs apparently to another genus, called by Schilberszky *Chrysophlyctis*, with the species *C. endobiotica*. I should be very glad to receive material of the warty Potato-disease, in order that I may study it."

Wound Parasite of Apple-trees.—Dr. Cooke, V.M.H., reported: "Mr. Fred. Chittenden, of Chelmsford Technical Laboratory, sent specimens of *Hydnum Schiedermayeri*, which is a wound parasite of the Apple-tree, and was found growing on an old-Apple tree at Maldon in Essex, for the first time recorded in Britain, although it is noted in Massee's 'Plant Diseases,' and figured. It formed a strip of about four feet growing through the bark. It has a nodulose appearance, of an ochry yellow or flesh colour, and the nodules develop long spines which are covered by the hymenium producing the spores. According to Thümen this fungus is very frequently destructive to Apple-trees, the spores entering through a wound or fissure in the bark."

Tomentum on Vine-leaves.—Dr. Bonavia sent leaves to show how closely natural woolliness, or tomentum, resembled the red-spider's web, and that it was impossible to distinguish between them by the naked eye. Mr. Saunders observes: "I should not think it could be possible for anyone to distinguish between the tomentum on the leaves and the web spun by the red spiders with the naked eye, unless the webs only covered parts of the leaves, in which case the undersides of the leaves would have a patchy appearance; but the similarity between the web and the tomentum is so great, that otherwise no ordinary eye could detect the difference. Under the microscope the threads of the tomentum are twisted, and do not lie so straight as the threads of the webs."

SCIENTIFIC COMMITTEE, OCTOBER 27, 1903.

Dr. M. T. MASTERS, F.R.S., in the Chair, and ten members present.

Crassula Aitoni.—Mr. Odell showed specimens of this Karroo plant of South Africa, remarkable for bearing, in lieu of flowers, leaf-buds, each consisting of two pairs of minute leaves.

Begonia bi-sexual.—Mr. Worsdell showed malformed flowers with

abortive ovaries, bearing a tuft of stamens issuing from the base of the style.

Spinach failing.—Mrs. Killick sent plants which were sown in August, and for three years consecutively at first they came up well, but subsequently turned yellow. Spring-sown Spinach never failed. It was suggested that if any grubs were present, lime and soot should be used before sowing. Other growers had experienced the same thing. A deficiency of midday sunlight appeared to affect Spinach, as a whole bed was a total failure in an enclosed place where the sun only shone upon it late in the day.

Jasmine Root hypertrophied.—Dr. Masters, F.R.S., showed a specimen of root hypertrophied forming a large mass, but no trace of insect or fungus was present. Mr. Massee, V.M.H., observed that ants will produce a very similar result on various plants; and frost has been known to be concerned in the production of similar outgrowths.

Parsley-leaf Miner.—Rev. W. Wilks showed leaves infested by some grub, upon which Mr. Saunders reported: "The Parsley leaves are attacked by the grubs of a fly, probably by those of the 'Celery fly' (*Tephritis onopordinis*), which they very much resemble; but the grubs of flies belonging to the same genus are often so much alike that it is impossible to distinguish between them. I have not heard of these grubs attacking Parsley before, but, as both Celery and Parsnips are injured by them, it is quite likely that Parsley may also be attacked, all these being umbellifers. The chrysalides are no doubt formed in the soil. If a crop has been badly injured by these grubs, it should be pulled up, and the ground well dressed with gas-lime."

Injurious Insects.—Miss Cope inquired for information how to destroy certain insects. Mr. Saunders reported: "The so-called insect sent by Miss Cope is one of the 'centipedes' (*Geophilus longicornis*). I cannot say positively whether it is injurious to plants or not, my own view being that it is not, as it belongs to a carnivorous family, and is provided with a large pair of poison-fangs, which would not be of any use to a creature feeding on vegetable substances. When found at the roots of plants, as they often are, I believe, they have gone there to feed on insects which have been attacking the roots; but they have been so often accused of injuring plants, and have been found under very suspicious circumstances, that I do not feel justified in giving a definite verdict. It is possible that when their ordinary food becomes scarce they may take to a vegetarian diet. The ordinary quick-running centipede is undoubtedly of much service in gardens in killing small insects, slugs, &c. The green insect spoken of is probably one of the *Cercopidæ*, the family to which the common froghopper belongs; but without seeing a specimen it is impossible to say positively. The best means of destroying this pest, if I am right, is to shake the plants over a sheet of pasteboard or tin which has been newly painted or tarred, so as to catch the insects when they jump off the plants."

Science at Wisley.—Dr. Masters, F.R.S., drew attention to the desirability of the Society utilising the Wisley Garden for scientific investigations bearing on gardening in addition to the requirements of practical horticulture. He invited suggestions from members of the Committee. It

was recalled that recommendations had already been laid before the Council, but they, knowing that they would shortly be moving to Wisley, had not seen their way at the time to consider the proposals favourably. Mr. Worsdell suggested communications with foreign horticultural institutions to gather hints of their methods, which might be turned to account. He would maintain that the scientific director should be a broad-minded man, and not merely a specialist; one who had a good knowledge of botany and practical horticulture. Professor Church, F.R.S., thought a start should be made in a humble way, only such instruments being obtained as the need arose for them. Mr. Massee, V.M.H., mentioned the following examples of objects worthy of further investigation, which should be undertaken: the silver-leaf disease, the gumming of Hyacinth-bulbs, as well as the investigation of the causes which render some varieties of Potatos immune from the disease, &c.

Scientific Committee, November 10, 1903.

Dr. M. T. Masters, F.R.S., in the Chair, and thirteen members present.

Scientific Investigations at Wisley.—In reply to Dr. Masters's request for suggestions, Mr. F. J. Baker wrote to say that in his opinion the botanical director should have a sound practical knowledge of general science (including biology, chemistry, and physics), and a sufficiently good knowledge of gardening to enable him to apply facts to such intricate problems as arise in connection with horticulture. He should be able to distinguish between the requirements of artistic, scientific, and economic gardening. Mr. Baker also made suggestions of a financial nature. Dr. Rendle in his communication discusses the question of expense and necessary appliances for the Director, *e.g.* microscope, apparatus, &c.

Potatos and Millipedes.—Mr. Chittenden showed Potatos badly attacked by these creatures. It was thought that an excess of manure and a deficiency of lime favoured their presence.

Croci new to Cultivation.—Mr. Bowles exhibited some growing plants of interesting species: *Crocus Cambessedesii*, Gay, introduced to cultivation by Mr. G. Maw, but subsequently lost. It is now re-introduced from Port Mahon in Minorca. It only occurs in Majorca and Minorca. *C. caspius*, Fischer and Meyer. This species is new to cultivation. It was collected in Russian Talych at an elevation of 1,000 feet. *C. c.* var. *liliaceus* has flowers of a pale rosy-lilac colour; the throat, as of the type, is of a bright yellow colour. A Botanical Certificate was given to the new species.

Pears malformed.—Some curious specimens were received from Mr. Goodacre, Elvaston. Prof. Henslow, V.M.H., examined them and reported as follows: "The stalk of the fruit had made a preliminary effort to form a Pear, but only on one side of it, thereby producing a curved, somewhat pointed, wenlike excrescence, due to the hypertrophy of the cortical tissues. This caused a curvature in the stalk; from out of this depression the stalk continues its growth, finally terminating in an elongated Pear. The core or carpels, when present, for they were in some instances suppressed,

were situated very close to the terminal depression which contained the calyx and other remnants of the flower."

Dictamnus albus (*Fraxinella*) *capsules.*—Dr. Masters, F.R.S., showed specimens illustrating the peculiar way the endocarp separates from the outer wall of each follicle. Then, by twisting, it jerks the seeds out. It was remarked that the seeds must not be allowed to dry lest they fail to germinate. Dr. Masters said he had a correspondent in Holland who told him that though the plant produced abundance of seeds in his garden, and he had for twenty years sown them regularly immediately after they ripened, not a single seed had ever germinated. Mr. Divers of Belvoir Castle, however, reported that with him the seed germinates freely by keeping it till March, and then sowing it in a seed-pan in a cold frame.

SCIENTIFIC COMMITTEE, NOVEMBER 24, 1903.

Dr. M. T. MASTERS, F.R.S., in the Chair, and twelve members present.

Scientific Investigations at Wisley.—Prof. Boulger remarked that it would be a comparatively inexpensive procedure to erect a Pine-wood building on a brick foundation for laboratory, store-room, &c., probably not exceeding £200 in cost. The equipment might be estimated to cost another £100, and the annual outlay, including remuneration to the Director, say £350. It was proposed to add these as suggestions to the memorial to be sent to the Council.

Canker in Apple-trees.—Badly diseased twigs were received from the neighbourhood of Salisbury. They proved to be attacked by *Nectria ditissima.* The only remedy suggested by Mr. Massee was to prune off all small wood and burn it, as well as to cut out diseased parts of boughs, and tar the places.

Pear Shoots diseased.—Specimens of diseased shoots were received from Mr. Ed. Till, Eynsford, Kent. Mr. Massee, V.M.H., suggested the following procedure: "The twigs are attacked by a fungus called *Fusicladium pirinum.* All diseased twigs should be pruned, and, along with fallen leaves and fruit lying under the tree, collected and burned. It would be an advantage to spray the tree with Bordeaux-mixture next spring, just after the leaf-buds have expanded."

Experiments for Commercial Purposes.—Mr. F. Baker reported some results of his experiments and observations on leguminous plants. For the last five years a few varieties of garden Peas, field Peas, Runner Beans, Vetches, Sainfoin, and other plants of the same natural order, have been grown on good and on poor soil respectively, parts of each plot being specially well tilled, parts dunged, and parts treated with phosphatic and potassic fertilisers. Strips were arranged so that some spots should be well tilled, and also have a dressing of all the fertilisers, and other spots were made to vary from nearly the same treatment to the poorest field culture. Results have shown that garden Peas and Beans cannot be profitably grown in very poor soil, manured solely with mineral fertilisers; but these respond well to tillage, dung, and then the minerals. On the other hand, Vetches, field Peas, Sainfoin, and others of the older plants grown on the farm can be most profitably grown on poor soil, manured

solely with minerals. Dung will largely increase the yield of stem and leaf in all, but does not materially increase the yield of seed. If, therefore, seed be required, grow on poor chalky soil without dung; but if fodder is required, dung may be profitably used as well as minerals. The experiments also show the great use of the Vetch in ameliorating the soil, greatly enriching it, and, at the same time, cleaning it very economically. It is suggested that garden plants, having been for many generations forced to an unnatural extent, are not able to adapt themselves to different conditions of soil, &c.; whereas field crops, which have had to seek for food to a large extent, are able to develop specially well-formed roots, which easily absorb water and such phosphatic, potassic, and other mineral plant-foods as are available, and on these roots are developed large numbers of nodules, by means of which an ample supply of atmospheric nitrogen is assimilated.

Scientific Committee, December 15, 1903.

Mr. A. D. Michael, F.L.S., in the Chair, and eleven members present.

Violets diseased.—Mr. Worsley showed specimens which Dr. Cooke, V.M.H., pronounced to be attacked by *Urocystis violæ*, recently figured in the Journal, vol. xxvii. p. 16, pl. i. fig. 19.

Longevity of Fern Spores.—A communication was received from Mr. H. Coleby, Wargrave, describing an instance of a piece of a stem of a *Dicksonia*, possibly twenty years old, on which, when broken off and kept moist, seedlings of *Gymnogramma aurea* began to appear. It was suggested that the spores of the latter had lain dormant for that length of time.

Mr. Druery, V.M.H., contributed the following note: "I have raised Ferns from spores seven to eight years old. The conditions mentioned by Mr. Coleby strike me as being exactly such as to maintain the power of germination for a very long time—*i.e.* absence of stimulating moisture or warmth. I have no doubt that the Fern arose from dormant spores. It is remarkable that only one kind of Fern germinated, though we must assume that other Fern-spores were present on the old *Dicksonia* stem." It was suggested, however, that the *Dicksonia* stem might have been previously utilised for growing only the *Gymnogramma*.

Ashwood with Grubs.—Specimens were received from Mr. G. Gregory, Croydon, with live grubs two years after the tree had been cut down. The wood outwardly showed no signs, but on being sawn asunder both dead and living grubs were frequently found. Mr. Saunders contributed the following observations: "The insects found in the Ash timber are beetles belonging to the family of Longicorns, and to the genus *Clytus*, but not being an English species, but probably American, I have not yet been able to obtain the specific name. The grubs of these beetles are sometimes very long-lived, and they remain for years in wood where their presence is quite unsuspected. A specimen of Longicorn beetle has been known to emerge from furniture, the wood of which was felled twenty-eight years previously. It is now supposed that the grubs which take such a long time in undergoing their metamorphoses have been hatched

from eggs which were laid in a tree which had just been felled, or was cut down shortly afterwards, so that the grub was soon obliged to feed on very dry wood, from which it obtained but little nourishment."

Albinism in Shirley Poppies.—A communication was received from Mr. John Bidgood, B.Sc., F.L.S. which will be found at p. 477. He recognises four forms of albinism in flowers—viz. incomplete, complete, partial, and local. After giving illustrations of the first three from Orchids, the last was taken from Poppies. The original plant of the Shirley Poppies had a white edging to the petals. It was evident, therefore, that this plant had a tendency towards albinism. The black blotch has disappeared from all Mr. Wilks's stock, being replaced by white. Other growers have experienced reversion to the black blotch. This is caused by a very strong solution of a dark red pigment contained in the epidermal cells on each surface of the petal, the usual cause of black being dark red overlying green, as on the leaves of *Arum maculatum*. The colour in the outer portion of the petals was also in the epidermal cells. On applying micro-chemical tests the behaviour of the colours of the two regions in question was very different. Strong sulphuric acid changed the black blotch to pink, brick-red, and orange; the outer part the same, but passed on to yellow, finally disappearing. Iodine in potassium iodide changed the blotch to port-wine colour; the outer part slowly faded. Solution of caustic potash changed the blotch to a deep blue, then faded out; the outer part to greenish yellow, then faded out. Neither of the pigments shows the typical reactions of the cyanic series, and still less of the xanthic.

Supertuberation in Potatos.—The following communication was received from Mr. F. C. Davidson, Wickham Bishops, Essex: "M. Bernard propounded the theory, in *Rev. Gén. de Bot.*, that tuberisation was due to the irritation set up by a fungus, and he had found that in the Potato there was a relation between the date of infection of the soil and the date of tuberisation. I would suggest a practical application of this theory." Then referring to Dr. B. Dyer's and Mr. Shrivell's paper on 'Manuring Market Garden Crops,' JOURNAL, vol. xxvii. p. 995, he observes: "Whereas such crops as Cabbages may be grown as well with artificial manure as with dung—indeed, it would seem, better and far more economically—this does not hold true of root crops, especially of Potatos. For instance, in the early varieties the average crop for some years was, from 50 loads of dung, 7 tons 7 cwt.; from 25 loads, 5 tons 14 cwt.; from (no dung) phosphates and 4 cwt. of nitrate of soda, 3 tons 6 cwt.; and from the same, with potash, 4 tons 10 cwt. The gap here, though potash fills it up a little, is most striking. If dung be favourable to bacteria, they may infest the soil and promote tuberisation. If this conjecture prove to be a fact, it might have a very great influence on the methods of cultivating root crops." Mr. Worsley thought it important to have the desiccated weight given, as the additional moisture in dung manuring would assist to swell the tubers. Mr. Baker said that Potato crops showed the greatest weight when planted in ground which had been manured with dung the previous season for Cabbage crops.

Diseased Pear Shoots.—In the spring two or three branches of 'Doyenné du Comice' were noticed dying and were at once cut off. Since then several

others have gone in the same way, no other trees in the neighbourhood being affected. Dr. Cooke, V.M.H., reported: "The young branches of Pear-tree are marked with effused patches, which are rough with slight elevations, causing cracking of the cuticle, such as would naturally result from the growth of abnormal pustules beneath the cuticle. In this instance, although in a young and immature condition, I have no doubt that these pustules or elevations are caused by the early or conidia-bearing stage of a fungus which is not uncommon, and in this condition has been known under the generic name of *Cytospora*. Later on, and in a more perfect condition, it is known as *Eutypella prunastri*, described and figured in the JOURNAL, vol. xxviii. p. 4, fig. 3. In the present case no conidia have been formed, so that the disease may be kept in check. It is advisable to spray the branches with Bordeaux mixture at intervals, so as to destroy the vitality of any conidia which may be formed. If this is not successful, the diseased parts should be cut out and burnt, and the wounds well protected."

Scientific Work at Wisley.—Dr. Masters, F.R.S., read the draft of a report which it was proposed to send to the Council. After consideration and slight alteration it was adopted by the Committee in the following form:—

To the President and Council of the Royal Horticultural Society.

Gentlemen,—At several recent meetings of the Scientific Committee a discussion has taken place as to the establishment of a laboratory in the Society's Garden and as to the appointment of a Director competent to initiate, carry on, or direct experiments and scientific researches having a bearing on practical horticulture.

It will be remembered that on a former occasion the object and scope of such an experimental station were explained in general terms, as detailed in the report of the Proceedings of the Scientific Committee on March 10, 1903 (Vol. XXVIII. p. xxviii). On April 7 (Vol. XXVIII. p. xxxiv) a reply was received stating that the Council were of opinion that under "existing circumstances" the consideration of the matter had better be deferred for twelve months.

Since that date the circumstances have been very materially altered by the announced decision of the Council to abandon Chiswick and by their acceptance of the munificent gift by Sir Thomas Hanbury of the Garden at Wisley.

It appears to the Scientific Committee that the general conditions for the establishment of a scientific department at Wisley are not so favourable in some particulars as they would have been at Chiswick, but that in other ways they may prove more so, whilst the necessity for such a department is as great or greater than ever.

Accordingly I was requested to bring the subject again under the notice of the Council, and to furnish a rough estimate of the probable cost of an establishment devoted to the purposes of investigation only, and not for the instruction of students, a matter which has not been taken into consideration by your Committee, but which would probably entail a little additional cost. It is suggested that at Wisley a wooden building on a permanent foundation, measuring, say, 36 feet by 12, and containing

a laboratory 18 feet by 12, might be erected for about £200. The equipment and outfit may be put at £100, so that the initial outlay would be approximately £300. The annual outlay for the upkeep, including the remuneration of the Director, would absorb, say, £350.

The figures given are merely conjectural, but may suffice to give some idea of the probable cost to the Society. More detailed and more accurate estimates could easily be obtained if the Council are pleased to assent to the general principles.

A beginning might be made on a small scale, and as regards the equipment of the laboratory, after providing for a few essential requisites, it would not be necessary to purchase costly instruments and appliances till they were found to be necessitated by the progress of the particular research to be carried on.

I was further instructed by the Committee to say that its members would be pleased to help in any way in their power towards the carrying out of the project herein alluded to.

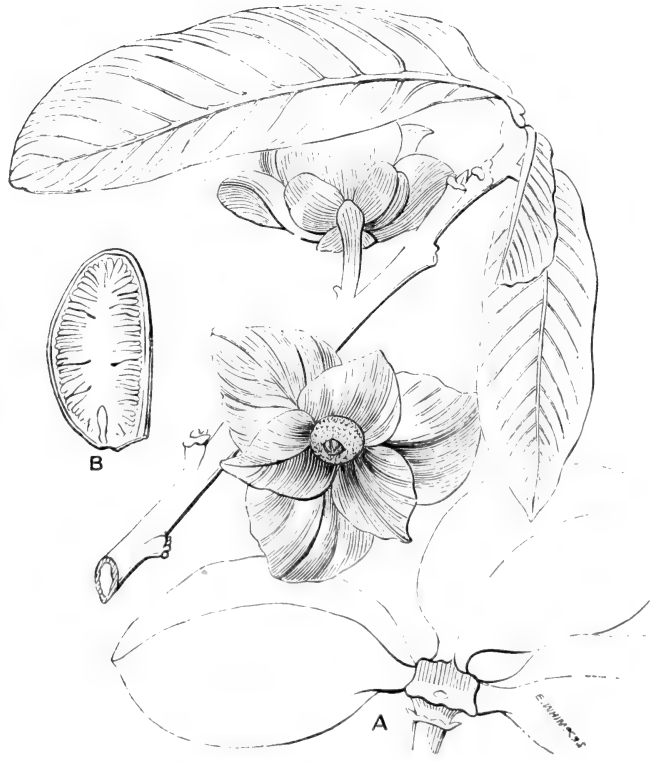
I have the honour to be, Gentlemen,

Your obedient servant,

MAXWELL T. MASTERS,

Vice-Chairman Sc. C.

Dec. 1903



FRUIT AND VEGETABLE COMMITTEE.

MAY 26, 1903.

AT THE TEMPLE GARDENS.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and twenty-three members present.

For the Cups and Medals awarded by the Council see page cviii.

Award Recommended:—

Award of Merit.

To Cucumber 'Mortimer's Unique' (votes, 14 for, 1 against), from Mr. Mortimer, Farnham. A seedling from 'Improved Telegraph' × 'British King,' combining the length and colour of the latter with the free-cropping qualities of the former.

Other Exhibits.

E. A. Hambro, Esq., M.P. Hayes Place, Kent (gr. Mr. W. Beale), sent Melon 'Conquering Hero.'

Mr. J. Vert, Audley End, sent an unnamed Melon.

FRUIT AND VEGETABLE COMMITTEE, JUNE 9, 1903.

Mr. H. BALDERSON in the Chair, and seventeen members present.

Exhibits.

Mr. MacKinley, Wrest Park, Ampthill, sent seedling Apples, very similar to 'Bess Pool.' It was requested that a dish be sent next year earlier in the season.

Mr. Roberts, Earl's Court Gardens, sent a Strawberry and flower grower, consisting of a series of shallow pans, arranged on a central support one above another.

Lady Warwick's Hostel, Reading, sent bottled fruits.

Miss Jackson, Montagu Square, sent bottled fruits.

Mr. Lodge, Mill Hill, brought 12 bunches of Black Hamburg Grapes from vines that have ripened fruit in May for twenty-eight consecutive years.

Mr. Fowler, Maidstone, sent bottled fruits.

Miss Martin, Willowbrook, Auburn, New York, sent bottled fruits, the Brandy Peaches and Pears being specially good.

The Horticultural College, Swanley, sent bottled fruits.

The Countess of Portsmouth, Hurstbourne Park, Whitchurch (gr. Mr. R. Perry), sent magnificent fruits of Strawberry 'Leader' which unfortunately arrived too late for the Committee.

FRUIT AND VEGETABLE COMMITTEE, JUNE 25, 1903.

AT HOLLAND HOUSE.

Mr. H. BALDERSON in the Chair, and twenty-two members present.

For the Cups and Medals awarded by the Council see page cxviii.

Exhibit.

The Horticultural College, Swanley, sent Melons 'College Favourite' and 'Swanley No. 1,' promising varieties, which the Committee desired to see again.

FRUIT AND VEGETABLE COMMITTEE, JULY 3, 1903.

AT CHISWICK.

Mr. H. BALDERSON in the Chair, and eleven members present.

Awards Recommended:—

First-class Certificate.

[For description of Peas see p. 193.]

To Pea 'Ideal' (votes, unanimous), from Messrs. Sutton, Reading.

Award of Merit.

To Pea 'The Pilot' (votes, uanimous), from Messrs. Hurst, Houndsditch, London.

To Pea 'Little Marvel' (votes, 10 for, 1 against), from Messrs. Sutton, Reading.

To Pea 'Gleaner' (votes, unanimous), from Messrs. J. Veitch, Chelsea.

To Melon 'Regina' (votes, unanimous), from Mr. Mortimer, Farnham. Fruit large, roundish-oval; skin greenish-yellow and heavily netted; flesh deep green, thick, and of excellent flavour.

FRUIT AND VEGETABLE COMMITTEE, JULY 7, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To Lord Llangattock, The Hendre (gr. Mr. Coomber), for 18 magnificent 'Queen' Pineapples, and a very fine dish of 'Raymaekers Peach.

Award of Merit.

To Melon 'President Loubet' (votes, unanimous), from F. H. Fawkes, Esq., Farnley Hall, Otley (gr. Mr. Snell). Fruit of medium size, roundish oval; skin yellow and heavily netted; flesh deep golden, thick, melting, and of delicious flavour.

Cultural Commendation.

To the Horticultural College, Swanley, for 'Lady Sudeley' Apples.

Other Exhibits.

Messrs. R. Veitch, Exeter, sent a splendid dish of Pea 'Western Express.'

Messrs. Low, Enfield, staged Figs and Vines in pots.

Mr. Fowler, Maidstone, sent a fruit-bottling apparatus.

The Horticultural College, Swanley, sent Melons.

Messrs. Cutbush, Highgate, staged Melon 'Incomparable.'

Messrs. Bunyard, Maidstone, sent a very interesting collection of Strawberries, including many old and little-known varieties.

FRUIT AND VEGETABLE COMMITTEE, JULY 14, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and nine members present.

Awards Recommended :—

First-class Certificate.

[For description of Peas see p. 193.]

To Pea 'Peerless Marrowfat' (votes, unanimous), from Messrs. Sutton, Reading.

To Pea 'Improved Monarch' (votes, unanimous), from Messrs. Sharpe, Sleaford.

Award of Merit.

To Pea 'Coleman's Favourite' (votes, 6 for), from Mr. Coleman, Sandwich.

To Pea 'Kaiser' (votes, unanimous), from Messrs. Webb, Stourbridge.

To Pea 'Rivenhall Wonder' (votes, unanimous), from Messrs. Cooper & Tabor, Southwark Street, S.E.

To Pea 'Aristocrat' (votes, unanimous), from Messrs. Sharpe, Sleaford.

To Pea 'Sherwood Forest' (votes, 7 for, 2 against), from Messrs. Hurst, Houndsditch, E.C.

To Pea 'Feltham Gem' (votes, 6 for, 3 against), from Messrs. J. Veitch, Chelsea.

To Pea 'Progression' (votes, 7 for, 2 against), from Messrs. J. Veitch.

FRUIT AND VEGETABLE COMMITTEE, JULY 21, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and fifteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. King, Coggeshall, for a collection of Peas.

First-class Certificate.

To the Loganberry (votes, unanimous), from Messrs. J. Veitch, Chelsea, and Mr. Denny, Blandford. (Fig. 177.)

Other Exhibits.

Mr. Mather, Kelso, sent Melon 'Lilburn Favourite.'

Mr. Becker, Jersey, sent Tomato 'Becker's Excel All,' which the Committee asked might be sent to Chiswick for trial. Also Gooseberry 'Grouville Giant,' to be grown beside 'Gunner' and 'Leader.'

Fig. 177.—The Loganberry. (*Journal of Horticulture.*)

Messrs. J. Veitch, Chelsea, staged Strawberry 'President Loubet,' a late dark-fleshed variety, which the Committee asked to have grown at Chiswick beside 'Waterloo.'

Messrs. Hobbies, Dereham, brought 'Lemon Cucumbers,' the fruits being small and roundish-oval, with a pale lemon-coloured skin, but exactly similar in flavour to the ordinary Cucumbers.

Mr. Hobday, Romford, sent Pea 'Essex Wonder,' which the Committee wished to have tried at Chiswick.

Mr. Will Tayler, Hampton, sent a seedling Peach named 'Libra.' Fruit large and of fair flavour.

Dr. Bonavia, Worthing, staged very fine bunches of the 'Strawberry' Grape.

Messrs. Cross, Wisbech, sent large fruits of Apple 'Early Victoria.' The Committee decided that it was synonymous with 'Emneth Early,' and that the latter was the older name of the two.

FRUIT AND VEGETABLE COMMITTEE, JULY 28, 1903.

AT CHISWICK.

Mr. JAMES SMITH, V.M.H., in the Chair, and ten members present.

The Committee examined the Potatos growing in the Gardens. On account of their heavy crop and excellent appearance, the following varieties were ordered to be cooked, viz.:

Alpha	Green's Seedling
Britannia	Harrison's Pride
British Queen	Leader
Cole's Favourite	Racehorse
Gem	Sir John Llewelyn
Sunlight	

[For description of Potatos see p. 557.]

Awards Recommended:—

Award of Merit.

To Potato 'Alpha' (votes, 8 for), from Mr. Thomas, Aberdare.

To Potato 'Gem' (votes, 6 for, 2 against), from Mr. Wythes, V.M.H., Syon House, Brentford.

To Potato 'Sunlight' (votes, 8 for, 1 against), from Mr. Titterington, Ribbleton.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 4, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and ten members present.

Award Recommended:—

Award of Merit.

To Peach 'Libra' (votes, 7 for), from Mr. Will Tayler, Hampton. Fruit rather large; skin pale, slightly spotted and flushed with red; shape deep round; flesh melting, parting freely from the stone, and of a very pleasant flavour.

Other Exhibit.

Dr. Bonavia, Worthing, sent fine bunches of Grape 'Sultanieh.' The variety which furnishes Sultana raisins of commerce. The berries are of

medium size, oval, and of a lovely bluish-amber colour, with a thick bloom. The flesh is agreeable in flavour, and has the great advantage of being, like 'Black Monnukka,' seedless.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 18, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and fourteen members present.

Awards Recommended:--

Silver-gilt Knightian Medal.

To Messrs. Dobbie, Rothesay, for early Potatos.

To Messrs. Spooner, Hounslow, for a collection of Apples.

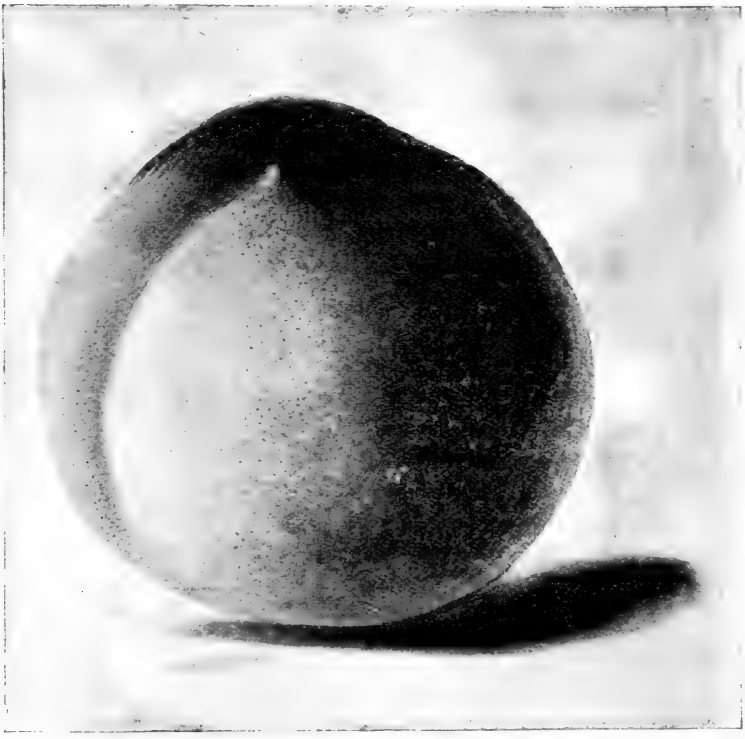


FIG. 178.—PEACH 'PEREGRINE.' (*The Garden.*)

Award of Merit.

To Scarlet Runner 'Hackwood Success' (votes, unanimous), from Mr. Bowerman, Hackwood Park, Basingstoke. Pods of great length, some 15 inches long, straight, deep green, and borne in very large clusters. A remarkably free-bearing variety.

To Peach 'Peregrine' (votes, 10 for, 3 against), from Messrs. Rivers, Sawbridgeworth. Fruit large, with a deep suture; skin covered with red, with spots of a deeper shade; flesh soft, melting, very juicy, of good flavour, and clinging to the stone. A mid-season or late variety raised from 'Spenser' Nectarine. (Fig. 178.)

Cultural Commendation.

To Mr. Hudson, V.M.H., Gunnersbury House, Acton, for a superb box of 'Royal Sovereign' Strawberries, grown on plants that had been forced early in the year and afterwards planted out in rich soil.

To Rev. G. F. Eyre, Far Forest, Worcestershire, for exceedingly fine pods of Pea, 'The Logan,' which the Committee requested might be sent to the Society's Gardens for trial.

Other Exhibits.

Mr. Kent, Norbury Park, Dorking, sent a very promising seedling Grape of unknown parentage. The berries were large, bluntly oval, black, and of good flavour; but they were not quite ripe.

Mr. Parr, Trent Park, Barnet, sent Tomato 'Coronation,' and Vegetable Marrow 'Green Bush.'

De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. Stables), sent a Cucumber named 'The Rosefield.'

The Duke of Northumberland, Syon House, Brentford (gr. Mr. Wythes, V.M.H.), staged some new Custard Marrows and new Melons.

Mr. Arthur F. Turnbull submitted samples of a new packing material for fruit. It was suggested that fruit would neither bruise nor decay in it. Mr. Jaques was requested to supervise an experimental package and report thereupon (see page 578).

FRUIT AND VEGETABLE COMMITTEE, AUGUST 24, 1903.

AT CHISWICK.

Mr. H. BALDERSON in the Chair, and seven members present.

Awards Recommended:—

Highly Commended.

[For description of Beans see p. 199.]

Dwarf French Bean 'Canadian Wonder' (votes, unanimous), from Messrs. Sutton, Sharpe, Dobbie, J. Veitch, and A. Dean.

Dwarf French Bean 'Reliance' (votes, unanimous), from Messrs. Sutton.

Dwarf French Bean 'Kingston Gem' (votes, unanimous), from Mr. A. Dean.

Dwarf French Bean 'Wythes's Early' (votes, unanimous).

Scarlet Runner Bean 'Champion' (votes, unanimous), from Messrs. Dobbie.

Scarlet Runner Bean 'Best of All' (votes, unanimous), from Messrs. Sutton.

Vegetable Marrow 'Sutton's Marrow' (votes, unanimous), from Messrs. Sutton.

Vegetable Marrow 'Defiance' (votes, unanimous), from Messrs. J. Veitch.

Melon 'Wythes's Duchess' (votes, unanimous), from Mr. Wythes, V.M.H.

Melon 'Regent's Park' (votes, unanimous), from Mr. Kelf.

Mr. Wythes also sent very large and beautifully coloured 'Lady Hasting' Grapes, and a basket of the fruits of the Wine-berry, *Rubus phœnicolasius*.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 1, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and eighteen members present.

Awards Recommended :—

Silver Banksian Medal.

To Lady Plowden, Aston Rowant (gr. Mr. Clarke), for a collection of Peaches, Nectarines, Plums, and Citrons.

First-class Certificate.

[See August 24, at Chiswick.]

To Dwarf French Bean 'Canadian Wonder.'

Award of Merit.

To Dwarf French Beans 'Reliance,' 'Kingston Gem,' and 'Wythes's Early.'

To Scarlet Runner Beans 'Champion' and 'Best of All.'

To Vegetable Marrows 'Sutton's Marrow' and 'Defiance.'

To Melon 'Regent's Park' (votes, unanimous), from Mr. Kelf, South Villa, Regent's Park. Fruit large, round; skin pale yellow and heavily netted; flesh pale Apricot colour, very sweet, melting, and luscious. Raised from 'Frogmore Scarlet' × 'Blenheim Orange.'

To Melon 'Wythes's Duchess' (votes, unanimous), from Mr. Wythes, V.M.H., Syon House. Fruit large, roundish-oval; skin green, heavily netted; flesh scarlet, deep, melting, and very rich in flavour. Raised from 'Best of All' × 'Syon House.'

Cultural Commendation.

To Mr. Howe, gr. to Lady Tate, Park Hill, Streatham, for Figs 'Bourgassotte Grise,' syn. 'Grizzly Bourgassote.'

Other Exhibits.

Lord Middleton, Birdsall (gr. Mr. Wadds), sent a new seedling Grape 'Wadds's Seedling.' Bunches long and shapely; berries round, medium size, white, with a thick skin; it would probably keep well.

Messrs. Rivers, Sawbridgeworth, sent Peaches.

Mr. Maher, Yattenden Court, sent a new Vegetable Marrow 'Codlins and Cream,' which the Committee asked to have cooked.

Messrs. Goff, Littlehampton, sent Melon.

Lady Wantage, Lockinge Park (gr. Mr. Fyfe), sent Apple 'Miller's Seedling.'

Lady Plowden, Aston Rowant, sent Melon 'Aston Rowant.'

Messrs. Dobbie, Rothesay, staged a Canteloupe Melon grown in a cool frame.

A. Gilliat, Esq., Duffield House, Slough (gr. Mr. Johnson), sent Melon 'Duffield Seedling.'

Mr. Gantley, Castlethorp, Brigg, sent Tomato 'Gantley's Ideal.'

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 11, 1903.

AT CHISWICK.

Mr. H. BALDERSON in the Chair, and nine members present.

The Committee examined the Potatos, Tomatos, Cabbages, Cauliflowers, Onions, &c., growing in the Gardens. On account of their good appearance and heavy crops, the following Potatos were ordered to be cooked, viz :—

Bountiful.
Dalmeny Beauty.
Daniel's Special.
Duncraig Castle.
Maid of Coil.
Giant Pink Kidney.
Harrison's Prelude.
Henry Fincham.
Lim Gray.

Awards Recommended :—

First-class Certificate.

[For description of Potatos, see p. 557.]

To Potato 'Lim Gray' (votes, unanimous), from Lord Carew, Belgrave Square, S.W.

Award of Merit.

To Potato 'Maid of Coil' (votes, unanimous), from Lord Carew.

To Potato 'Dalmeny Beauty' (votes, unanimous), from Mr. James Smith, V.M.H., Mentmore.

To Potato 'Henry Fincham' (votes, unanimous), from Mr. Fincham, Cranbrook.

To Cauliflower 'Eclipse' (votes, unanimous), from Messrs. Dammann, Naples.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 15, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and eighteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. Dickson & Robinson, Manchester, for a wonderful collection of admirably grown Lettuces.

Silver-gilt Knightian Medal.

To Messrs. Spooner, Hounslow, for Apples.

Other Exhibits.

Mr. Godfrey, sent Apple 'Venus's Pippin.'

J. W. Perkins, Esq., Sidbury Lodge, Edgware (gr. Mr. Randall), sent a hybrid Bean, Scarlet Runner × Dwarf French Bean. The Committee requested that seeds might be sent to the Society's Gardens for trial.

Mr. Kipling, Knebworth House, Stevenage, staged a very large Melon named 'Montreal Improved Nutmeg.'

The Horticultural College, Swanley, sent a very curious twin Melon, both fruits being of good size and perfect in form, but joined together.

Colonel Archer Houblon, Welford Park (gr. Mr. Ross), sent Melon 'Surma,' and Apple 'Ruddy,' raised from 'Ecklinville' × 'Mère de Ménage.'

The Dowager Countess of Harrowby, High Ashurst, Dorking, sent a Pea named 'Beau Idéal,' exactly resembling 'The Gladstone.'

Mr. King, East Hordon, sent Potato 'Recompense,' which the Committee wished should be tried in the Society's Gardens.

Mr. Rich, Sandford, Churchill, sent a pretty Apple 'Rich's Favourite.' The Committee asked to see it earlier next year.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 29, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and nineteen members present.

Awards Recommended :—

Silver Knightian Medal.

To the Marquis of Exeter, Burghley, Stamford (gr. Mr. Metcalfe), for Melons.

To Miss Adamson, South Villa, Regent's Park (gr. Mr. Kelf), for Melons.

Award of Merit.

To Cabbage Lettuce 'Lord Kitchener' (votes unanimous), from Messrs. Dickson & Robinson, Manchester. Heads large, very firm, pale green, and with a very small spread of the outer leaves.

To Cabbage Lettuce 'Staghorn' (votes unanimous), from Messrs. Dickson & Robinson. Foliage much divided, in appearance resembling an Endive, very dark green on the outside, changing to a very pale colour at the heart, heads nearly white, of good size, and quite firm.

To Strawberry 'The Roydon' (votes unanimous), from Major-General E. Abbot Anderson, Roydon, Camberley. Fruit of medium size, roundish, dark red in colour, and of excellent flavour for an autumn-fruiting variety.

To Melon 'Marquis's Favourite' (votes unanimous), from the Marquis of Exeter, Burghley (gr. Mr. Metcalfe). Fruit of medium size, roundish-oval; skin deep yellow and heavily netted; flesh pale, very deep, melting, and of exquisite flavour.

To Carrot 'Veitch's Intermediate' (votes unanimous), from Messrs. R. Veitch, Exeter. A very fine form of this well-known variety.

To Celery 'Pink Plume' (votes 17 for), from Messrs. R. Veitch. A pink form of 'White Plume,' which it exactly resembles save in colour.

Cultural Commendation.

To Mr. Hall, Collar House, Prestbury, for Tomato 'The Premier.'

To Messrs. Dobbie, Rothesay, for 'International Prize' Leeks.

Other Exhibits.

Colonel Cornwallis West, Ruthin Castle (gr. Mr. Forder), sent a handsome dish of Tomatos.

Messrs. Dickson & Robinson, Manchester, staged Lettuces 'Distinction' and 'Giant Market Cos.'

Mr. Vcss, Ireton, Kedleston, sent Tomatcs which the Committee requested might be grown in the Society's Gardens.

Mr. Seward, Hanwell, staged Tomato 'Hanwell Victory.'

Major-General E. Abbot Anderson sent late Strawberry 'The Abbot,' a very promising variety.

Henry Knott, Esq., Stamford, sent Apple 'Stamford Gem' raised from 'Blenheim Orange' × 'Cox's Orange.'

Mr. Aldridge, Teddington, brought a seedling white Grape, very similar to 'Foster's Seedling.'

Messrs. Rogers, Southampton, sent Apple 'Bassett Beauty.'

Mr. Holmes, Norwich, sent a new Runner Bean, very much like 'Dolichos' in appearance.

Mr. Kelf, South Villa, Regent's Park, staged Melon 'Regent's Park,' which the Committee desired to see again.

Mr. Pettener, Manchester, sent two very large Vegetable Marrows named 'Model' raised from 'Long Cream' × 'Pen-y-byd.'

Mr. Attrill, Southsea, sent some huge tubers of Potato 'Up-to-date,' the majority weighing over 2 lbs. each.

Mr. Parr, Trent Park, New Barnet, staged Tomatos 'Coronation' and 'Trent Beauty.'

The Marquis of Exeter (gr. Mr. Metcalfe) sent Melon 'Pride of Burghley,' a promising variety which the Committee asked to see again.

Mr. W. Brown, Stamford, sent a large handsome Apple 'Stamford Wonder,' which the Committee wished to see later.

Messrs. R. Veitch, Exeter, staged Potato 'Progressive,' Onion 'Wildsmith,' Borecole 'Albino,' and Savoy 'Blood Red.'

Mr. Ambrose, Cheshunt, sent a new seedling Grape raised from 'Lady Hastings' × 'Gros Colmar,' named 'Melton Constable Seedling.' The Committee wished to see it again.

Messrs. Whitmore, Swanley, sent two Melons.

Dr. Bonavia sent a basket of Cape Gooseberries, *Physalis peruviana*, a native of South America, the fruit of which is much esteemed by some for dessert.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 13, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and eighteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Lady Tate, Park Hill, Streatham (gr. Mr. Howe), for a collection of Grapes.

To Messrs. W. Paul, Waltham Cross, for fruit trees in pots.

Silver Knightian Medal.

To E. A. Hambro, Esq., M.P., Hayes (gr. Mr. Beale), for black Hamburg Grapes grown in a cold house.

Award of Merit.

To Melon 'Fiscal Problem' (votes, 13 for), from Mr. Barnes, gr. to A. F. Walter, Esq., Bear Wood. Fruit of medium size, round; skin a

rich yellow and heavily netted; flesh scarlet, thick, melting, and very luscious. An excellent variety for so late in the season. Raised from 'Eureka' crossed with a seedling.

To Apple 'Middle Green' (votes, 11 for, 4 against), from Messrs. J. Veitch, Chelsea. Fruit of medium size, of the shape and with the eye of 'Cox's Orange'; skin yellow, striped and spotted with red on the sunny side, stalk ½ in. long, thin, and deeply inserted in a russety cavity; flesh rather soft, and of very good flavour. Raised from 'Frogmore Prolific' and 'Blenheim Orange.' (Fig. 179.)

Other Exhibits.

Mrs. Gleadow, Ladbroke Grove, staged large fruits of *Rubus rosæfolius*.

Mrs. Miller, Marlow, sent samples of Elderberry syrup, a non-alcoholic drink, specially recommended for colds.

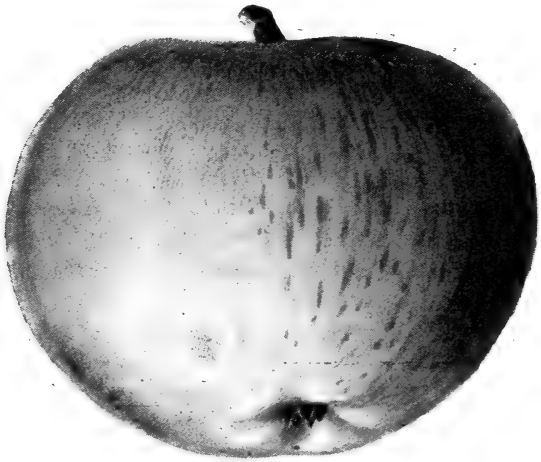


Fig. 179.—Apple 'Middle Green.' (*Journal of Horticulture.*)

The Lubrose Paint Company, Moorgate Street, sent samples of paints.

Messrs. Dobbie, Rothesay, staged Shallot 'Large Red' and 'Dwarf Blood Red' Cabbage. The latter the Committee wished to have tried in the Society's Gardens.

A. Sutton, Esq., V.M.H., Bucklebury Place, Woolhampton (gr. Mr. Harris), sent exceptionally fine fruits of Strawberry 'St. Joseph' from plants that had been fruiting for more than a month.

Mr. Webster, Gordon Castle, Fochabers, sent Plums 'Grand Duke,' and a seedling 'Gordon Castle' resembling 'Crimson Drop.'

Mr. Gregory, Canterbury Road, Croydon, staged Green Tomato Pickle of good quality.

Mr. Beckett, Aldenham House, Elstree, sent samples of a patent tree fastener, which the Committee wished to have tried at the Society's Gardens.

Mr. Tanner, Grove Ground, Shanklin, brought Potato 'Thomas Southam,' which the Committee requested should be tried in the Society's Gardens.

Mr. A. Dean proposed, and Mr. A. H. Pearson seconded, that a vote of condolence be sent to Mrs. James Smith and family on their bereavement through the death of Mr. James Smith, V.M.H., for many years a most valuable member of this Committee. The proposition was carried unanimously, both the gentlemen named and the Chairman testifying to the high character of the deceased, and the great loss the Committee had sustained through his death.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 27, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and seventeen members present.

Award Recommended:—

Cultural Commendation.

To Mr. Chamberlain, gr. to S. Heilbut, Esq., Holyport, Maidenhead, for fine specimens of 'Celeriac.'

Other Exhibits.

Mr. Vokes, King's Worthy, Winchester, sent a very promising seedling Apple 'Sure Cropper,' which the Committee asked to see again next March.

Mr. Pritchard, Ross-on-Wye, sent two Vegetable Marrows very similar to the 'Brazilian Sugar Squash.'

Mr. Cutler, Tulse Hill, staged excellent Apples.

Mr. Ambrose, Cheshunt, brought Grape 'Melton Constable Seedling,' which the Committee wished to see again in December to test its keeping qualities.

Mr. Wright reported that he had tried the Efficient Heating Co.'s, York Place, W., "Tray Economiser" sent by Messrs. Geo. Cotton of Holmes Chapel and fixed to the boiler at Chiswick. He found that the consumption of fuel was one-third less, and that the temperature was from 10° to 15° higher, than was the case before the "Tray Economiser" was fixed to the boiler.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 10, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and fourteen members present.

Award Recommended:—

Award of Merit.

To Melon 'Westonbirt Seedling' (votes, unanimous), from Mr. Chapman, gr. to Captain Holford, C.I.E., Westonbirt. Fruit of medium size, oval, with a pale green skin, heavily netted; flesh deep green, thick, melting, and of very fine flavour. It is stated to be a free setter, and equally good for house and for frame culture.

Other Exhibits.

Mr. Allan, Gunton Park, staged large fruits of Apple 'Norfolk Beauty.'

Mr. Jorden, Lanaway House, Godalming, sent a seedling Apple 'Robert Jorden' somewhat similar to 'Cockle Pippin,' but hardly as good.

Mr. Moody, Charlton, Wilts, sent an unnamed Potato.

Mr. Potten, Cranbrook, sent an Apple very like 'Baron Ward.'

Mr. Ambrose, Cheshunt, staged Grape 'Melton Constable' which the Committee asked to see again next year with 'Gros Colmar' and foliage of both varieties.

Messrs. Cooper & Taber sent long handsome roots of the Japanese Radish 'Ninengo daikon,' a useful variety for late autumn and winter use. The seed should be sown at the end of April on soil that has been deeply worked, and as the foliage is spreading the seedlings should be thinned out to eight inches apart.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 24, 1903.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and fifteen members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To Sir Charles Russell, Bart., Swallowfield Park, Reading (gr. Mr. Cole), for a collection of Grapes, large in bunch and beautifully coloured.

Other Exhibits.

Mr. Crook, Forde Abbey, sent Apple 'Crimson King,' and an unnamed variety, which the Committee asked to be seen again in March.

Mr. Crawley, The Grange, Kippington, sent a seedling Grape 'Kippington Grange Seedling,' a nice-looking black variety, with medium-sized round berries, but of indifferent flavour.

Messrs. Williams, Upper Holloway, staged Savoy 'Williams's Conical,' which the Committee asked to have tried at Wisley.

Mr. Ambrose, Cheshunt, brought Grapes 'Gros Colmar' and 'Melton Constable,' with foliage of both. As it was claimed that 'Melton Constable' was a very late variety, the Committee requested that it might be shown again in March.

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 15, 1903.

Mr. G. BUNYARD, V.M.H., in the Chair, and twenty members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To C. Bayer, Esq., Tewkesbury Lodge, Forest Hill (gr. Mr. Taylor), for an excellent collection of fruit.

Silver Banksian Medal.

To Lord Aldenham, Elstree (gr. Mr. Beckett), for exceedingly large and firm 'Improved Ailsa Craig' Onions.

Other Exhibits.

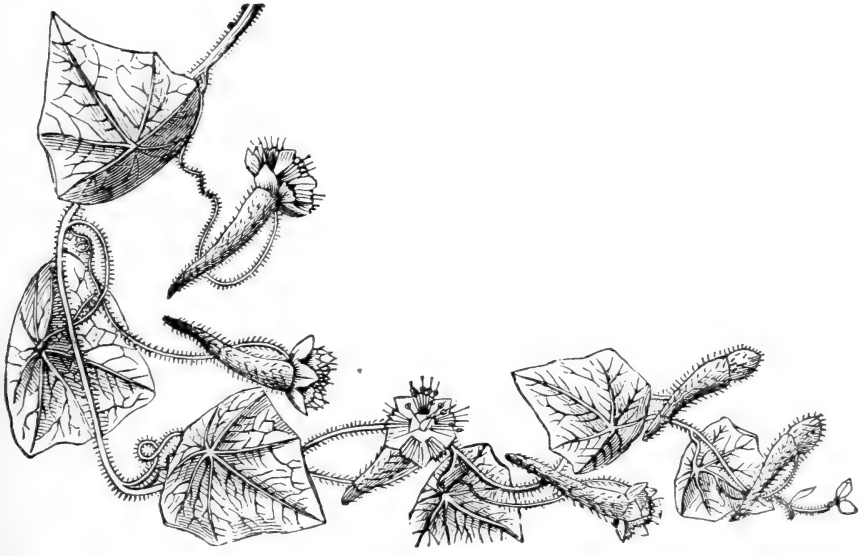
Mr. Bellis, Fonthill Lodge, Forest Hill, staged very large home-grown 'Seville Oranges.'

Mr. Ross, gr. to Col. Archer Houblon, Welford Park, sent a seedling Pear 'R. D. Blackmore,' raised from 'Winter Nelis' × 'Comte de Lamy.' The fruits were over-ripe, and the Committee asked to see it again next year.

The Earl of Ilchester, Holland House (gr. Mr. Dixon), staged some highly flavoured fruits of Pears 'Glou Morceau' and 'Beurre Rance.'

A. D. Hall, Esq., Rothamsted, sent six varieties of Salad Potatos. Mr. Hall wrote: "These varieties are extensively grown in Germany for making salads. Their special features are their small size, waxiness, and superior flavour, together with the retention of their colour when boiled and allowed to get cold. They should be boiled, and when cold served in salad, either whole or sliced. I find 'Mäuschen' and 'Comte des Chèvres' best in my strong soil." It was suggested that some of each should be grown in the Society's Garden at Wisley.

John G. Sandeman, Esq., of Whin-Hurst, Hayling Island, sent two magnificent fruits of Persimmon which had been grown in a cold house in the garden of Eldred Curwen, Esq., Withdeane Court, Brighton. Each fruit weighed $10\frac{1}{2}$ ounces and was almost globular in shape, being $10\frac{3}{4}$ inches in circumference. In colour they were of clear bright orange and extremely handsome. The flesh also was orange-coloured, very juicy, with flakes of jellylike substance, and exceedingly sweet. The skin is astringent, making it better to eat the fruit with a spoon. The fruits are not properly ripe until they are *very* soft to the touch. If the Persimmon can be grown as finely as these fruits proved it can be, we should consider it well worth the attention of amateurs for fresh fruit at Christmas.



FLORAL COMMITTEE.

May 26, 1903.

Temple Gardens.

Mr. H. B. May in the Chair, and twenty-six members present.

The Cups and Medals awarded by the Council will be found at page cviii.

Awards Recommended :—

First-class Certificate.

To *Polypodium Knightæ* (votes, unanimous), from Messrs. Sander, St. Albans. A handsome Australian Fern with drooping fronds 3 feet to 4 feet in length and fringed rich green pinnæ 4 inches long. A splendid basket Fern.

To *Ficus pandurata* (votes, unanimous), from Messrs. Sander. A free-growing species of upright habit well adapted for lofty greenhouses. Its obovate-oblong thick dark green alternate leaves are 15 inches long by 12 inches broad with prominent light green veins.

Award of Merit.

To *Phyllocactus* 'Deutsche Kaiserin' (votes, 11 for, 2 against), from Mr. Kohlmannslehner, Berlin. A variety with semi-double shell-pink flowers, deeper than those of *Epiphyllum delicatum*, borne along the edges of the flat stout leaflike growths.

To Tea Rose 'Queen of Sweden and Norway' (votes, 6 for, 1 against), from Messrs. Paul & Son, Cheshunt. A fragrant shapely yellow flower passing to a lighter shade.

To *Richardia hybrida* 'Solfatara' (votes, 10 for), from Mr. Bornemann, Blankenburg, Germany. The leaves of this variety are spotted with creamy-white like those of *R. Elliottiana*, and the large leathery pale sulphur spathes are blotched with purple at the base.

To double Begonia 'Mrs. Portman Dalton' (votes unanimous), from Messrs. Blackmore & Langdon, Twerton-on-Avon. Beautifully shaped flesh-coloured flowers with a raised rose-pink centre. (Fig. 166.)

To double Begonia 'Sir Thomas Lipton' (votes, 10 for, 4 against) from Messrs. Blackmore & Langdon. Large deep orange flowers of good form and substance.

To double Begonia 'Hon. Lady Neeld' (votes, 7 for, 1 against), from Messrs. Blackmore & Langdon. Unusually large deep rose flowers touched with pale salmon. (Fig. 165, p. cx.)

To double Begonia 'Mrs. W. P. Neal' (votes, unanimous), from Messrs. Blackmore & Langdon. Large shapely white flowers suffused with salmon-pink on the exterior of the young petals.

To double Begonia 'Mrs. Moger' (votes, 9 for, 1 against), from Messrs. Blackmore & Langdon, and Messrs. Davis, Yeovil. A pleasing variety with medium-sized soft salmon flowers of great substance.

To *Rhododendron* (*Azalea*) *mollis* 'Florodora' (votes, 11 for), from Messrs. Cuthbert, Southgate. A free-flowering variety with large compact trusses of yellow flowers about 3 inches across, spotted, streaked, and flushed with orange-yellow on the upper segments. An improvement on 'President Cleveland.'

To *Selaginella Watsoniana* (votes, unanimous), from Messrs. Sander. A dense-growing variety after the style of *S. Martensii*, with flat fronds heavily tipped and shaded with silvery-white.

To *Dracæna* 'Père Charon' (votes, unanimous), from Monsieur Draps-Dom, Brussels. Broad bronzy-crimson leaves brighter than *D. terminalis stricta*.

Fig. 180.—Rosa polyantha 'Blush Rambler.' (*Journal of Horticulture.*)

To *Geum Heldreichii superbum* (votes, unanimous), from Mr. Perry, Winchmore Hill. This grows about a foot high and bears rich orange-yellow flowers much larger and brighter than those of the type.

To *Rosa multiflora* 'Waltham Rambler' (votes, 10 for, 4 against), from Messrs. W. Paul, Waltham Cross. A very free-growing variety adapted for pillars and arches. It bears enormous clusters of pale pink single Dogrose-like flowers.

To *Rosa polyantha* 'Blush Rambler' (votes unanimous), from Messrs. B. R. Cant, Colchester. This is the result of crossing 'Crimson Rambler' with 'The Garland.' Flowers larger, more substantial, and deeper in colour than those of 'Waltham Rambler,' but borne more sparingly. (Fig. 180.)

To single Begonia 'Lady Howe' (votes, 11 for), from Messrs Laing, Forest Hill. Pure white flowers 4 inches across with frilled edges.

Cultural Commendation.

To T. A. Dorrien-Smith, Esq., Tresco Abbey, Scilly, for a magnificent spike of *Puya lanuginosa* grown in the open air.

Other Exhibits.

George Yeld, Esq., Clifton Cottage, York, sent *Anthericum* 'Arethusa.'

Percy Waterer, Esq., Fawkham, sent twelve varieties of Sweet Peas. The committee asked to see flowers from the open ground.

From Mr. Vert, Audley End, came a very fine strain of *Primula obconica hybrida grandiflora.*

Mr. Child, Acock's Green, sent hardy flowers.

Messrs. Low, Enfield, sent *Dimorphotheca Eckloni*, a pretty South African composite, and *Lobelia* 'Low's Triumph.'

Messrs. Walshaw, Scarborough, sent a group of Marguerite 'Golden Sun.'

R. Farrer, Esq., Ingleborough, Lancaster, sent *Tiarella superba.*

From Mr. Godfrey, Exmouth, came Pelargoniums and Oriental Poppies.

Mr. Robson, Hale Road, Altrincham, sent Petunias.

Messrs. Storrie, Dundee, sent border auriculas.

Messrs. Stokes, Hilperton Marsh, sent *Lupinus hybridus* 'W. J. Stokes.'

FLORAL COMMITTEE, JUNE 9, 1903.

Mr. H. B. MAY in the Chair, and twenty members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To A. C. Harmsworth, Esq., Sutton Place, Guildford (gr. Mr. Goatley), for Calceolarias.

To Messrs Dobbie, Rothesay, for Aquilegias and Pansies.

To Messrs. Cutbush, Highgate, for Eremurus, Carnations, and Begonias.

Silver-gilt Banksian Medal.

To Messrs. Wallace, Colchester, for hardy flowers.

To Messrs. Kelway, Langport, Somerset, for Pæonies and Delphiniums.

To Messrs. B. R. Cant, Colchester, for Roses.

To Mr. Perry, Winchmore Hill, for hardy plants.

To Messrs. Jas. Veitch, Chelsea, for *Kalanchoë flammea* and hardy plants.

Silver Flora Medal.

To Mr. May, Edmonton, for Ferns.

To Messrs. Bull, Chelsea, for Codiæums (Crotons) and Dracænas.

Silver Banksian Medal.

To Messrs. Peed, West Norwood, for Gloxinias.
To Messrs. Ware, Feltham, for hardy flowers.
To Mr. Prichard, Christchurch, Hants, for hardy flowers.
To Messrs. Paul, Cheshunt, for Roses and hardy flowers.
To Messrs. Watkins & Simpson, Covent Garden, for annuals.
To the Guildford Hardy Plant Nursery, for Irises.
To Messrs. Cannell, Swanley, for Aquilegias.

Bronze Flora Medal.

To Ronald Keep, Esq., Woollet Hall, North Cray (gr. Mr. Pym), for Gloxinias and Ferns.
To Mr. Prince, Longworth, Berks, for Roses.
To Messrs. Jackman, Woking, for alpine plants.

Bronze Banksian Medal.

To Mr. Potren, Branbrook, for hardy flowers and cut shrubs.

Award of Merit.

To *Adiantum scutum ramosum* (votes, unanimous), from Mr. May. A seedling from the type from which it differs in its fan-shaped fronds and deep green pinnæ.

To *Kalanchoë kewensis* (votes, unanimous), from Messrs. Jas. Veitch. A vigorous hybrid between *K. Bentii* ♂ and *K. flammea* ♀, and remarkable for its pink or rosy-purple flowers borne in large branching corymbs. The leaves are fleshy, long and narrow, and of a beautiful metallic or glaucous green colour.

To *Calochortus pulchellus verus* of Douglas (votes, unanimous), from Messrs. Wallace. A hardy Mariposa Lily with drooping greenish-yellow flowers, the inside of the petals being covered with short hairs.

To *Heuchera hybrida* 'Rosamunde' (votes, unanimous), from Messrs. Wallace. This is the result of crossing *H. micrantha rosea* with *H. sanguinea*. Its slender spikes 2–3 feet long bear a great number of small terra-cotta flowers quite distinct from any other member of the genus. (Fig. 181.)

To *Schœnia Cassiniana* (as a greenhouse annual) (votes, 8 for, 1 against), from Messrs. Hurst, Houndsditch. A beautiful and uncommon Australian composite closely allied to *Helichrysum* and introduced to this country in 1845. It grows about 18 inches high, has lanceolate deep green opposite leaves 4 inches long, and bears rosy-purple "everlasting" flowers in terminal and axillary corymbs with great freedom. (Fig. 182.)

To Pink 'Snowdrift' (votes, unanimous), from Mr. Douglas, V.M.H., Great Bookham. A large shapely white flower with a pale rosy-purple zone near the base of the petals.

Other Exhibits.

Dr. Bonavia, Worthing, sent beautiful sprays of *Bignonia grandiflora*.

Martin R. Smith, Esq., Hayes (gr. Mr. Blick), sent Malmaison and Border Carnations.

From W. Shuter, Esq., Hampstead, came *Hymenocallis* (*Pancratium*)

calathina, a stove species introduced from Brazil more than a hundred years ago.

F. A. Bevan, Esq., Trent Park (gr. Mr. Parr), sent a group of Verbenas.

M. C. Hulbert, Esq., Ealing (gr. Mr. Skingle), sent a promising Carnation named 'White Wings.'

FIG. 181.—HEUCHERA × 'ROSAMUNDE.' (*The Garden.*)

T. Martin, Esq., Watford (gr. Mr. Williamson), sent double Begonia 'Thomas Martin.'

Dr. Langdon-Down, Hampton Wick (gr. Mr. Cullimore), sent *Ageratum mexicanum variegatum.*

Mr. Hersey, Harlow, sent large flowers of a very sweet-scented Carnation named 'Mrs. Horace Calverley.'

Mr. Revens, Burwell, sent Carnation 'Queen Alexandra.'

From Messrs. Cannell, Swanley, came double Begonias.

Messrs. Bunyard, Maidstone, sent hardy flowers and Rhododendrons.

Mr. Lion, Stanmore, sent Royal Pelargonium 'Mrs. I. Lion,' a sport from 'Madame Thibaut.'

Mr. Box, West Wickham, sent a very large double white Begonia named 'Mrs. John R. Box.'

Fig. 182.—Schœnia Cassiniana. (*Journal of Horticulture.*)

Mr. Bradley, Chingford, sent Pinks.

Messrs. Dobbie, Rothesay, sent varieties of *Verbascum* raised between *V. pannosum* and *V. phœniceum.*

The Efficient Lighting and Heating Co., Portman Square, W., sent a model of Stubbs's Patent Fuel Economiser.

Mr. Anker, Kensington, sent cactaceous plants.
Messrs. Frank Cant, Colchester, sent Roses.
Messrs. Stokes, Trowbridge, sent hardy flowers and rock plants.
Messrs. Philips & Taylor, Bracknell, sent Malmaison Carnations.
Messrs. Barr, Covent Garden, sent hardy flowers.
Mr. Reuthe, Keston, sent hardy flowers.
Messrs. Low, Enfield, sent Malmaison Carnations.

FLORAL COMMITTEE, JUNE 11, 1903.

AT CHISWICK.

Mr. H. B. MAY in the Chair, and seven members present.

Awards Recommended :—

Highly Commended.

Iris amœna 'Mrs. H. Darwin.'
I. amœna 'Innocenza.'
I. pallida.
I. pallida 'Albert Victor.'
I. pallida 'Coeleste.'
I. pallida dalmatica.
I. 'Queen of May.'
I. squalens walneriana.
I. variegata 'Darius.'
I. variegata 'Gracchus.'
I. variegata 'Mrs. Neubronner.'
I. sibirica lactea.

Commended.

Iris pallida 'Mandraliscoe.'
For descriptive report see page 183.

FLORAL COMMITTEE, JUNE 25, 1903.

AT HOLLAND HOUSE.

Mr. H. B. MAY in the Chair, and twenty-three members present.

For the Cups and Medals awarded by the Council see page cxviii.

First-class Certificate.

To *Lilium auratum platyphyllum* 'Shirley var.' (votes, 13 for), from Messrs. Wallace, Colchester. An unusually vigorous form, 6 feet or so high, with spotless white flowers, with a pale golden band down the centre, larger than those of the type. This variety has been propagated from a single small bulb by the Rev. W. Wilks. At first it was extremely delicate and hard to rear, but of late years it has developed extraordinary strength and vigour and multiplies itself with great rapidity.

Award of Merit.

To Pæony 'Dawn' (votes, 7 for, 3 against), from Messrs. Wallace. A semi-double variety with large pale purple or rose-pink cup-shaped flowers with a conspicuous cluster of yellow stamens in the centre.

To Border Carnation 'Shiela' (votes, 7 for, 1 against), from Messrs. Cutbush, Highgate. Beautifully shaped flowers with large substantial

pale yellow petals flaked and edged with crimson. An improvement on 'Monarch.'

To Border Carnation 'Lady Wolverton' (votes, 6 for), from Messrs. Cutbush. A very sweet-scented salmon flower with rather flat slightly serrated petals.

To double Begonia 'Countess of Warwick' (votes, unanimous), from Messrs. Blackmore & Langdon, Bath. A shapely medium-sized flower of a lovely apricot-yellow, the outer petals suffused with salmon and beautifully serrated.

To double Begonia 'W. Sparshott' (votes, 11 for), from Messrs. Davis, Yeovil. Flowers large, deep crimson, with broad smooth shell-like petals.

To single Begonia 'Gipsy Girl' (votes, 10 for, 3 against), from Messrs. Davis. A medium-sized pale pink flower edged with a deeper shade. On the central portion of each petal there is a conspicuous deep pink crest.

To single Begonia 'The Queen' (votes, 9 for), from Messrs. Laing, Forest Hill. Large beautifully shaped delicate salmon-pink flowers.

To *Delphinium* 'Rev. W. Wilks' (votes, unanimous), from Messrs. Kelway, Langport. A superb spike with bold substantial semi-double purplish-blue flowers.

To *Delphinium* 'Monarch' (votes, unanimous), from Mr. Notcutt, Woodbridge. A vigorous spike with large deep blue single flowers.

To *Papaver orientale* 'Lady Roscoe' (votes, 7 for, 1 against), from Mr. Notcutt. Medium-sized flowers with wavy orange-red petals blotched with black near the base.

To *Nicotiana Sanderæ* (votes, unanimous), from Messrs. Sander, St. Albans. A cross between *N. rubra* and *N. affinis*, and similar in habit of growth and size of flowers to the last-named parent. Flowers purple or rose-pink.

To *Eremurus* 'Mrs. Reuthe' (votes, 9 for), from Mr. Reuthe, Keston. A slender-growing variety obtained by crossing *E. turkestanicus* with *E. Warei*. Flowers small, sulphur or pale yellow, with conspicuous orange-red anthers.

To strain of Iceland Poppies (votes, unanimous), from Messrs. Storrie, Dundee. A remarkably fine strain with large variously coloured flowers.

To *Lilium Kelloggii* (votes, 9 for, 1 against), from Messrs. Barr, Covent Garden. A slender-growing Californian species with small rose-purple reflexed flowers freely spotted with crimson and shaded with yellow towards the base of the petals.

Other Exhibits.

Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. Bain), sent flowers of *Eurycles Cunninghamii* and *Cynoglossum furcatum*. The Committee asked to see a plant of the latter.

Messrs. Bunyard, Maidstone, sent *Senecio Grayi*.

From Mr. Clark, York, came a new bedding Pelargonium named 'Ebor.'

Mr. Robson, Altrincham, sent *Dianthus* 'Napoleon III.'

Messrs. Low, Enfield, sent new Carnations.
Mr. Townsend, Bloxham, Oxon., sent *Pelargonium* 'Victoria.'
Messrs. Ware, Feltham, sent hardy flowers.
Mr. Bradley, Chingford, sent Pinks.

FLORAL COMMITTEE, JULY 7, 1903.

Mr. H. B. MAY in the Chair, and eighteen members present.

Silver-gilt Flora Medal.

To Messrs. Jas. Veitch, Chelsea, for Cannas, Carnations, Sweet Peas, and Campanulas.

To Mr. May, Upper Edmonton, for 112 varieties of Crotons.

Silver Flora Medal.

To Messrs. Wallace, Colchester, for hardy flowers.

Silver Banksian Medal.

To Miss Willmott, V.M.H., Warley Place, Essex, for a group of Verbena 'Warley.'

To Mr. Prichard, Christchurch, Hants, for hardy flowers.

To Messrs. Ware, Feltham, for hardy flowers.

To Messrs. B. R. Cant, Colchester, for new Roses.

To Messrs. Peed, West Norwood, for Carnations.

To Mr. Perry, Winchmore Hill, for hardy flowers.

Award of Merit.

To *Nephrolepis cordifolia crispata congesta* (votes, 7 for), from Mr. May. A sturdy little plant with fronds 6 inches long, and deep green undulated wavy pinnæ.

To *Campanula peregrina* (votes, 12 for, 1 against), from Messrs. Jas. Veitch. An old but little-known biennial species from Asia Minor, with upright spikes of pale lavender-blue flowers about an inch in diameter. Leaves small, green, serrated, and very hairy.

To Border Carnation 'Diadem' (votes, unanimous), from Messrs. Cutbush, Highgate. Large yellow flowers flaked and edged with rose.

To Border Carnation 'Merlin' (votes, unanimous), from Messrs. Cutbush. Large substantial pale yellow flowers flaked and margined with scarlet or crimson.

Other Exhibits.

Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. Hudson, V.M.H.), sent beautiful flowers of *Nymphæa Mooreana*.

Lord Aldenham, Elstree (gr. Mr. Beckett), sent flowers of *Inula glandulosa* with fringed petals.

A. Dodd, Esq., Godington Park, Kent (gr. Mr. Ward), sent shapely flowers of Tree Carnation 'Mrs. Ashley Dodd.'

From Sir Weetman Pearson, Bart., M.P., Paddockhurst (gr. Mr. Wadds), came *Plumeria bicolor*, an old-fashioned stove plant with white flowers.

F. H. Fawkes, Esq., Farnley Hall, Otley (gr. Mr. Snell), sent a promising Delphinium named 'F. H. Fawkes.' The Committee asked to see this again.

Mrs. Backhouse, Sutton Court, Hereford, sent Lilies.

Mr. Douglas, V.M.H., Great Bookham, sent Malmaison and Border Carnations.

Mr. Potten, Cranbrook, sent hardy flowers.

Messrs. Cheal, Crawley, sent Sweet Peas.

Messrs. Cutbush, sent Border Carnations.

Mr. Anker, Kensington, sent cactaceous plants.

FLORAL COMMITTEE, JULY 15, 1903.

AT CHISWICK.

Mr. H. B. MAY in the Chair, and eleven members present.

Awards Recommended :—

Award of Merit.

To Poppy 'Mephisto,' from Messrs. Barr, Covent Garden,

To Poppy 'Cardinal,' white, from Messrs. Dobbie, Rothesay.

To *Papaver glaucum*, from Messrs. Dobbie, Messrs. Barr, and Messrs. Jas. Veitch, Chelsea.

Highly Commended.

To Poppy 'White Colossal,' from Messrs. Barr.

To Poppy 'Blush Cardinal Victoria,' from Messrs. Dobbie.

To *Papaver Murselli fl. pl.* 'American Flag,' from Messrs. Dobbie.

To *Papaver arenarium*, from Messrs. Dobbie.

A descriptive report on Poppies will be found on page 190.

FLORAL COMMITTEE, JULY 21, 1903.

Mr. H. B. MAY in the Chair, and twenty-five members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. James Veitch, Chelsea, for Java Rhododendrons, herbaceous plants, Border Carnations, and Sweet Peas.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations.

Silver Flora Medal.

To Lawrence C. Currie, Esq., Minley Manor, Farnborough, for Water Lilies.

To Mr. May, Edmonton, for a collection of Gymnogrammas.

To Mr. Dutton, Bexley Heath, Kent, for Carnations.

Silver Banksian Medal.

To Messrs. W. Paul, Waltham Cross, for Roses.
To Messrs. Wallace, Colchester, for hardy flowers.
To Mr. Perry, Winchmore Hill, for hardy flowers.
To Mr. Douglas, V.M.H., Great Bookham, for Carnations.
To Messrs. Paul & Son, Cheshunt, for new Roses.

First-class Certificate.

To *Nymphæa gigantea Hudsoni* (votes, unanimous), from Leopold de Rothschild, Esq., Acton (gr. Mr. Hudson, V.M.H.) A vigorous and

FIG. 183.—NYMPHÆA GIGANTEA HUDSONI. (*The Garden.*)

handsome Water Lily raised at Gunnersbury House from *N. gigantea*. The flowers are very large, about 9 inches across, very substantial, and of a lovely blue, reminding one of *Vanda cærulea* (fig. 183).

Award of Merit.

To Begonia 'Marie Bouchette' (votes, 11 for, 5 against), from W. Greenwell Esq., Marden Park (gr. Mr. Lintott). An excellent basket plant with long stout growths and deep-green serrated leaves. The

drooping scarlet flowers are perfectly double, the outer petals broad, inner ones narrow, twisted and occasionally forked at the tips.

To *Asparagus plumosus cristatus* (votes, unanimous) from Sir Trevor Lawrence, Bart., Burford (gr. Mr. Bain). A dense-growing form with deep green foliage and numerous tufts or crests closely packed together at the extremities of the shoots or frond-like growths.

To *Nephrolepis exaltata Fosteri* (votes, 11 for, 4 against), from Messrs. Hill, Edmonton. A splendid basket fern of free growth introduced from America, with long deep green fronds cut to the midrib and the pinnæ again subdivided. It is easily raised from spores.

To *Pteris cretica metallica* (votes, 7 for, 2 against), from Mr. May. A sturdy-growing fern with long broad deep green fronds slightly serrated at the margins. It is likely to prove an excellent plant for dwelling-rooms.

To *Lilium elegans* 'Peter Barr' (votes, 8 for, 4 against), from Messrs. Barr, Covent Garden. Lovely orange-yellow flowers nearly 7 inches across, not so deep in colour as 'Orange Queen,' and spotted with brownish-crimson near the base of the upper petals. The stems are from a foot to 15 inches high.

Commended.

Strain of Dobbie's Auricula-eyed Sweet William (*Dianthus barbatus*) (votes, unanimous), from Messrs. Dobbie, Rothesay. A beautiful strain with large finely formed variously coloured flowers with well-defined centres.

Cultural Commendation.

To Lawrence C. Currie, Esq., for Water Lilies.

Other Exhibits.

Lady Plowden, Aston Rowant (gr. Mr. Clarke), sent a collection of Sweet Peas.

Sidney Hallam, Esq., Taptonville Road, Sheffield, sent seedling Pinks.

The Hon. H. Bourke, Esher, sent flowers of a new Carnation.

Lord Barrymore, Fota, Queenstown, sent *Chrysanthemum maximum grandiflorum*, a large-flowered variety with cut petals.

W. Garton, Esq., Sarisbury Court, Southampton, sent new Crotons.

From Sir Trevor Lawrence, Bart., came *Campanula macrostyla* and *Passiflora maculifolia*, a pretty climbing plant with variegated leaves.

F. A. Bevan, Esq., Trent Park (gr. Mr. Parr), sent a new Verbena.

R. Hoffmann, Esq., Streatham, sent seedling Caladiums.

H. Acres, Esq., Clapham, sent *Campanula Medium* var.

Mr. H. Crawley, Kippington, sent flowers of *Dipladenia Crawleyana*.

Messrs. Cannell, Swanley, sent bedding Begonia 'Eureka.' The Committee asked to see this again from the open ground without stakes.

Messrs. Bunyard, Maidstone, sent *Monarda didyma Davidsoni*.

Messrs. Hill, Edmonton, sent new Ferns.

Messrs. W. Paul sent Tea Rose 'Earl of Warwick.' The Committee asked to see this again in September.

Messrs. Bath, Wisbech, sent Carnations.

Messrs. Barr, Covent Garden, sent hardy flowers.
Messrs. Bull, Chelsea, sent Fuchsias.
Messrs. Phillips & Taylor, Bracknell, sent Carnations.
Messrs. Peed, West Norwood, sent Carnations.

FLORAL COMMITTEE, AUGUST 4, 1903.

Mr. H. B. MAY in the Chair, and fourteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. May, Edmonton, for 36 species and varieties of *Nephrolepis.*

To Messrs. Cuthbert, Southgate, for Hydrangeas, Crinums, and Liliums.

Silver-gilt Banksian Medal.

To Messrs. Cannell, Swanley, for cactaceous plants.

Silver Flora Medal.

To Messrs. Cheal, Crawley, for shrubs and Dahlias.

Silver Banksian Medal.

To Messrs. Paul, Cheshunt, for Roses.
To Messrs. Dobbie, Rothesay, for Pentstemons and Poppies.
To Messrs. Bull, Chelsea, for Dracænas.

First-class Certificate.

To *Nephrolepis exaltata Piersonii* (votes, unanimous), from Mr. May. A handsome fern raised in America, with long broad dense fronds cut to the midrib, the pinnæ again subdivided with beautifully undulated margins. The colour is polished green, passing to a paler shade towards the tips of the stout pinnæ.

Award of Merit.

To *Gladiolus* 'Ellington Belle' (votes, unanimous), from W. C. Bull, Esq., Ramsgate. A grand spike with large shapely cream- or delicate sulphur-coloured flowers flaked with rosy-purple towards the edges of the stout segments. The base of the flower is stained with purple.

Other Exhibits.

H. Dart, Esq., Thornton Heath, sent bedding Carnation 'His Majesty.'

Mrs. Bramwell, King's Worthy, Winchester, sent two flowers each of three varieties of Petunias. The Committee drew attention to the rule that three flowers of each variety must be shown. Mrs. Bramwell also sent a seedling Pelargonium named 'Dorothy Brown,' which was damaged in transit, but resembled one named 'Oliver.'

W. C. Bull, Esq., sent some very promising seedling Gladioli.

Lawley Parker, Esq., Chad Road, Edgbaston (gr. Mr. Sclaney), sent a well-grown plant of *Pteris Victoria elegans.*

Mr. W. Lees, Midston Hall, Hamilton, sent *Athyrium filix fœmina*

crispatissima cristata (Lees), a strong-growing Lady Fern with beautiful fronds.

Messrs. Jas. Veitch, Chelsea, sent *Lantana salviæfolia*, *Fuchsia* 'Sylvia,' and *Senecio clivorum*.

Mr. Anker, Kensington, sent cactaceous plants.

FLORAL COMMITTEE, AUGUST 18, 1903.

Mr. H. B. MAY in the Chair, and twenty members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Mr. May, Edmonton, for Bouvardias.

To Messrs. Kelway, Langport, for Gladioli.

Silver-gilt Banksian Medal.

To Messrs. Webb, Saffron Walden, for Hollyhocks

Silver Flora Medal.

To Baron Schröder, V.M.H., Englefield Green (gr. Mr. Ballantine), for a collection of Canadian hybrid Gladioli.

To Messrs. Jas. Veitch, Chelsea, for hardy flowers.

To Messrs. Barr, Covent Garden, for hardy flowers.

Silver Banksian Medal.

To Mr. Potten, Cranbrook, for hardy flowers.

To Messrs. Cheal, Crawley, for Dahlias.

To Mr. Perry, Winchmore Hill, for hardy flowers.

To Messrs. Ladhams, Southampton, for hardy flowers.

Award of Merit.

To *Gladiolus* 'The Nymph' (votes, 17 for, 1 against), from W. C. Bull, Esq., Ramsgate. Handsome spreading white flowers borne all round the spike, lip touched with lemon and stained with purple at the base of the throat.

To *Gladiolus* 'Lady Muriel Digby' (votes, unanimous), from Messrs. Kelway. Large pale yellow or primrose flowers with a deeper lip and stained with crimson at the base.

To Tuberous Begonia 'Bavaria' (votes, unanimous), from Mr. Pfitzer, Stuttgart. A lovely dwarf bedding variety of compact habit, and wonderfully free-flowering. Flowers single ; magenta or cerise-scarlet.

To *Tamarix odessana* (votes, 12 for), from Messrs. Paul & Son, Cheshunt. A graceful shrub of free growth, and a first-rate subject for seaside planting. The tiny pale mauve or pink flowers are borne in great abundance on long slender drooping racemes.

Other Exhibits.

Leopold de Rothschild, Esq., Gunnersbury (gr. Mr. Hudson, V.M.H.), sent Water Lilies, and amongst them a splendid flower of *Nymphæa* 'George Hunter,' a night-flowering variety.

Lord Tredegar, Newport (gr. Mr. Bone), sent an unnamed Fern which proved to be *Lastrea lepida*.

W. D. Freshfield, Esq., Reigate (gr. Mr. Coomber), sent border Carnations.

W. C. Bull, Esq., sent eight seedling Gladioli.

Mr. A. Chapman, Manor House, Wakefield, sent a salmon-coloured sport from *Pelargonium* 'West Brighton Gem.'

Messrs. Ballington, Matlock, sent Carnation 'The Duchess.'

Mr. Baxter, Woking, sent Cactus Dahlias.

Mr. Pfitzer sent Tuberous Begonias with frilled petals.

From Messrs. R. Veitch, Exeter, came hardy flowers and *Fagus Zlatia*, a sturdy-growing golden Beech from Servia.

Mr. Shoesmith, Woking, sent Cactus Dahlias.

From Mr. Perry came flowers of *Nymphæa* 'James Brydon.' The Committee asked to see it again.

Messrs. Paul & Son sent Phloxes.

Mr. Notcutt, Woodbridge, Suffolk, sent *Onopordon bracteatum* and *Veratrum nigrum*.

Messrs. Peed, West Norwood, sent Alpine plants.

Floral Committee, September 1, 1903.

Mr. H. B. May in the Chair, and twenty-one members present.

Awards Recommended :—

First-class Certificate.

To *Vitis Thomsoni* (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. The leaves of this new and handsome Vine from Central China are somewhat similar to those of *Vitis* (*Ampelopsis*) *hederacea*, but the leaflets are very much finer. The colour is green passing to purple (fig. 184, see also p. 389).

Award of Merit.

To *Vitis sinensis* (votes, 9 for, 4 against), from Messrs. Jas. Veitch. Another hardy species with cordate and three lobed glaucous leaves, purple veinings and reddish-purple petioles. A native of Central China.

Vitis megaphylla (votes, 13 for), from Messrs. Jas. Veitch. Of vigorous habit, with large, much cut, glaucous green leaves, and reddish leaf-stalks, the whole reminding one of *Koelreuteria paniculata* (p. 389).

To *Vitis flexuosa Wilsoni* (votes, 11 for, 1 against), from Messrs. Jas. Veitch. A rather slender-growing variety, with broad glossy green leaves and prominent veins reminding one of *V. inconstans* (syn. *Ampelopsis Veitchi*) (see p. 389).

To *Vitis armata* (votes, 10 for), from Messrs. Jas. Veitch. This is a free-growing hardy species from Central China, with rich green heart-shaped leaves, lobed and serrated. The stems and leaf-stalks are very spiny, and in the autumn the leaves turn to the most glorious crimson.

Hidalgoa Wercklei (votes, 16 for), from Sir Trevor Lawrence, Bart., Burford (gr. Mr. Bain). On account of the similarity of its flowers to

those of a single Dahlia, the plant bears the appropriate name of The Climbing Mexican Dahlia. The flowers are small and vivid scarlet, but unfortunately are borne very sparingly. It is a rampant climber suitable for clothing rafters and pillars in lofty greenhouses.

Fig. 184.—Vitis Thomsoni. (*Journal of Horticulture.*)

To border Chrysanthemum 'The Champion' (votes, 12 for), from Messrs. Wells, Earlswood. A sturdy free-flowering Japanese variety with bright yellow flowers.

To *Chrysanthemum maximum* 'King Edward' (votes, 11 for, 1 against),

from Mr. W. Angus, Penicuik. This is best described as the largest of the *C. maximum* group. The florets are broad, thick, and pure white.

To *Tamarix hispida æstivalis* (votes, 13 for), from Messrs. R. Veitch, Exeter. A free-growing ornamental hardy shrub of graceful habit, with long racemes of pink or light purple flowers borne freely even on very young plants.

To *Gladiolus* 'Van Dael' (votes, unanimous), from Messrs. Wallace, Colchester. Very fine pale-rose flowers, with crimson and purple markings, each segment striped with white down the centre.

Other Exhibits.

Sir Trevor Lawrence, Bart., sent three varieties of Gladioli.

Lady Plowden, Aston Rowant, sent flowers of a new Border Carnation named 'Lady Plowden.'

From Colonel Tillotson, Beckbury Hall, Shifnal (gr. Mr. Thomas), came a green flower of an unnamed *Hippeastrum*, grown from a bulb received from South America.

W. C. Bull, Esq., Ramsgate, sent Gladioli.

F. Samuelson, Esq., Breckenbrough Hall, Thirsk (gr. Mr. Brotherston), sent a new Carnation.

Mr. Young, Southend, sent Zonal Pelargonium 'Southend Gem,' a very promising variety.

Mr. Price, Shanklin, I.W., sent Cactus Dahlia 'Passive Resister.'

Messrs. Jas. Veitch sent a large collection of their new Chinese ornamental hardy Vines (see page 389).

Messrs. Wells sent border Chrysanthemums.

Messrs. Hobbies, Dereham, sent Fuchsias and beautiful plants of *Iris pallida variegata*.

Messrs. Ware, Feltham, sent Liliums and Lobelias.

Mr. Shoesmith, Woking, sent Cactus Dahlias.

Messrs. Jones, Shrewsbury, sent Carnations.

Mr. Notcutt, Woodbridge, sent Phloxes.

Messrs. Dobbie, Rothesay, sent Cactus Dahlias.

Floral Committee, September 15, 1903.

Mr. W. Marshall in the Chair, and twenty-one members present.

Awards Recommended :—

Gold Medal.

To Messrs. Jas. Veitch, Chelsea, for Nepenthes.

Silver-gilt Flora Medal.

To Messrs. Jeffries, Cirencester, for Roses.

Silver-gilt Banksian Medal.

To Messrs. Wallace, Colchester, for hardy flowers.

To Messrs. Cheal, Crawley, for Dahlias.

To Messrs. Ware, Feltham, for hardy flowers.

To Messrs. Cutbush, Highgate, for hardy flowers.
To Messrs. Cannell, Swanley, for Cannas.

Silver Flora Medal.

To Baron Schröder, Englefield Green (gr. Mr. Ballantine), for Nerines.
To Messrs. Hill, Edmonton, for Gleichenias, &c.
To Messrs. Bull, Chelsea, for foliage plants.

Silver Banksian Medal.

To Mr. May, Edmonton, for *Adiantum Farleyense.*
To Mr. Gwillim, Eltham, for Begonias.
To Messrs. Wells, Earlswood, for Chrysanthemums.

Bronze Flora Medal.

To Messrs. Ladhams, Southampton, for hardy flowers.
To Messrs. Barr, Covent Garden, for hardy flowers.

Award of Merit.

To Single Dahlia 'Rosebank Scarlet' (votes, unanimous), from E. Mawley, Esq., Berkhamsted. Bright scarlet flowers of good form and substance.

To Cactus Dahlia 'Dainty' (votes, unanimous), from Messrs. Hobbies, Dereham. Large handsome flowers with narrow primrose petals, the outer ones pale purplish-pink.

To Cactus Dahlia 'Sweet Nell' (votes, unanimous), from Messrs. Hobbies. A pretty variety with fluted or quilled pale purplish-pink petals shading to cream in the centre.

To Single Dahlia 'Darkness' (votes, unanimous), from Messrs. Cheal. Beautifully shaped deep crimson flowers with a conspicuous yellow centre.

To Cactus Dahlia 'George Gordon' (votes, unanimous), from Messrs. Stredwick, St. Leonards. Large golden-yellow flowers changing to soft apricot towards the ends of the petals.

To Cactus Dahlia 'Mrs. H. L. Brousson' (votes, unanimous), from Messrs. Stredwick. Large soft apricot-coloured flowers with quilled petals.

To Cactus Dahlia 'Miss F. M. Stredwick' (votes, unanimous), from Messrs. Stredwick. Cream-white flowers with long quilled petals shading to green near the centre.

To Pompon Dahlia 'Queen of Whites' (votes, unanimous), from Mr. Turner, Slough, beautifully shaped white flowers slightly touched with lemon yellow.

To Pompon Dahlia 'San Toy' (votes, unanimous), from Mr. Turner. Small flowers with cream-white petals heavily edged with purple.

To *Smilax aspera* (*S. sagittæfolia*) (votes, 12 for), from Messrs. Jas. Veitch. A free-growing hardy Chinese climbing shrub with heart-shaped glossy green leaves beautifully mottled with silvery-grey.

To *Senecio tanguticus* (*S. Henryi*) (votes, unanimous), from Messrs. J. Veitch. An upright hardy border plant 4–6 feet high, with deep green deeply cut leaves, and terminal panicles of small yellow star-shaped flowers (fig. 185).

To *Sidalcea* 'Rosy Gem' (votes, unanimous), from Messrs. Ware. Small mallow-like flowers borne on long upright spikes.

Fig. 185.—Senecio tanguticus. (*Veitch.*)

Other Exhibits.

Frank Lloyd, Esq., Coombe House, Croydon (gr. Mr. Mills), sent beautiful flowers of Chrysanthemum 'Miss Winifred Lloyd,' a sport from 'Madame Desgranges.'

The Hon. Mrs. Rowley, Whitchurch, sent Cactus Dahlias.

S. Stouton, Esq., Child's Hill, sent an unnamed *Crinum*, which was considered to be *C. giganteum*.

Messrs. Hillier, Winchester, sent a very promising *Coleus*.

Mr. Shoesmith, Woking, sent Cactus Dahlias.

Mr. Belcher, Stanford-le-Hope, sent Cactus Dahlias.

From Messrs. Gunn, Market Hall, Birmingham, came a very fine collection of new Phloxes.

Messrs. Dobbie, Rothesay, sent Fuchsias.

Messrs. Keynes Williams, Salisbury, sent Cactus Dahlias.

Messrs. Paul, Cheshunt, sent hardy flowers.

FLORAL COMMITTEE, SEPTEMBER 29, 1903.

AT CHISWICK.

Mr. W. MARSHALL in the Chair, and eighteen members present.

Awards Recommended:—

Awards of Merit.

To border Chrysanthemum 'Polly' (votes, 8 for), from Messrs. Wells, Redhill. A dwarf-growing variety with large orange-red flowers, changing to bright yellow with age.

To *Lilium speciosum magnificum* (votes, 6 for, 3 against), from Messrs. Wallace, Colchester. Of very robust habit, 4ft. in height, with purple stems, broad dark green leaves, and rose-coloured flowers with deep crimson spots.

To Cactus Dahlia 'Amos Perry' (votes, 12 for), from Messrs. Hobbies, Dereham. Large bright scarlet flowers, with long, narrow, and incurved petals. The flowers are thrown up well above the foliage on long erect stems.

To Cactus Dahlia 'Spotless Queen' (votes, 13 for), from Messrs. Hobbies, and Messrs. Dobbie, Rothesay. Medium-sized pure white flowers, with broad reflexed petals; the stems rather short but stiff, and erect.

To Cactus Dahlia 'Spitfire' (votes, 9 for), from Messrs. Dobbie. Large bright scarlet flowers, with long broad petals, slightly incurved; the flowers are borne on long erect stems well above the foliage.

Other Exhibits.

Mr. Perry, Winchmore Hill, sent three varieties of Michaelmas Daisies *Sedum spectabile atrosanguineum* and *Helenium autumnale cupreum*.—From Messrs. Wells came early-flowering and Japanese Chrysanthemums.

Messrs. Wallace sent *Kniphofia breviflora* and *Sternbergia lutea major*.

FLORAL COMMITTEE, OCTOBER 13, 1903.

Mr. W. MARSHALL in the Chair, and twenty-four members present.

Awards Recommended.

Silver-gilt Flora Medal.

To Messrs. J. Veitch, Chelsea, for Pelargoniums, Chrysanthemums and Begonias.

Silver-gilt Banksian Medal.

To Messrs. Jefferies, Cirencester, for Roses.
To Messrs. Ware, Feltham, for Cactus Dahlias.

Silver Flora Medal.

To Messrs. Peed, South Norwood, for Chrysanthemums.
To Messrs. Cheal, Crawley, for Dahlias.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for Michaelmas Daisies.
To Messrs. Hobbies, Dereham, for Cactus Dahlias.

Bronze Floral Medal.

To Mr. Ambrose, Cheshunt, for flowering plants.

Bronze Banksian Medal.

To Mr. Godfrey, Exmouth, for Chrysanthemums.
To Messrs. Wells, Redhill, for Chrysanthemums.

First-class Certificate.

To *Nephrolepis Mayi* (votes, unanimous), from Mr. May, Edmonton. A tall erect variety, said to be a seedling from *N. rufescens*; the pinnæ on the deep green fronds are very much twisted, which gives to the plant a distinct and very interesting appearance.

Cultural Commendation.

To Messrs. Bull, Chelsea, for Dracæna 'Victoria.'

Other Exhibits.

Mr. Prince, Loughborough, sent border Chrysanthemum 'Vivian Prince.'

From Messrs. Hobbies came Aster 'Queen of the Dwarfs.'

Mr. Shoesmith, Woking, sent Cactus Dahlia 'Nellie.'

Mr. Potten, Cranbrook, sent Chrysanthemum 'Le Pactole.'

Monsieur F. Gervene, Nancy, sent three varieties of Zonal Pelargoniums.

From Messrs. Crane, March, came Tree Carnations.

Mr. Perry, Winchmore Hill, sent *Polygonum molle* and other hardy flowers.

Mr. Gwillim, Feltham, sent Begonia blooms.

Messrs. Bunyard, Maidstone, sent hardy flowers.

Mr. Russell, Richmond, sent berried Aucubas.

Mr. Reuthe, Keston, brought Hardy Flowers.

Mr. May, Edmonton, sent a collection of Ferns and Bouvardias.

From F. Lloyd, Esq., Croydon, came some sports from Begonia 'Gloire de Lorraine.'

Messrs. Cuthbert, Southgate, sent cut spikes of an *Ornithogalum* which were cut by Mr. S. Cuthbert on Signal Hill, Cape Town, on September 17, and forwarded to England as an ordinary parcel. They were in a wonderfully fresh condition, considering they had been cut for nearly a month.

FLORAL COMMITTEE, OCTOBER 27, 1903.

Mr. W. MARSHALL in the Chair, and twenty-four members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. Norman Davis, Framfield, for Chrysanthemums.

Silver-gilt Banksian Medal.

To Messrs. Wells, Earlswood, for Chrysanthemums.
To Messrs. Cutbush, Highgate, for alpine plants.

Silver Flora Medal.

To Mr. Jones, Lewisham, for Chrysanthemums and Asters.
To Messrs. Cannell, Swanley, for Zonal Pelargoniums.
To Messrs. Ware, Feltham, for Dahlias.
To Messrs Jas. Veitch, Chelsea, for Begonias and Pelargoniums.

Silver Banksian Medal.

To Mr. Ambrose, Cheshunt, for a miscellaneous group.
To Mr. Lange, Hampton, for Begonias.
To Mr. May, Edmonton, for Dracænas.
To Mr. Russell, Richmond, for shrubs.
To Mr. Godfrey, Exmouth, for Chrysanthemums.

Awards of Merit.

To Begonia 'Our Queen' (votes, unanimous), from Messrs. Sander, St. Albans. A hybrid between *Begonia Rex* and *B. Bowringiana*, the last-named being the seed parent. The leaves are not so broad as in *B. Rex*, being more acuminate, and are of a dark bronzy-green colour. About one inch from the margin there is a zone or band of bright green, thickly spotted with reddish spots.

To Begonia 'His Majesty' (votes, 15 for, 1 against), from Messrs. Sander. Also a cross between *B. Rex* and *B. Bowringiana*, *B. Rex* in this case being the seed parent. The leaves resemble those of *B. Rex* in shape, and the colour is a mixture of reddish tint and silvery-white; in the centre of the leaf the colour is velvety-brown.

To Chrysanthemum 'F. S. Vallis' (votes, 13 for, 3 against), from Mr. Godfrey. A large smooth Japanese flower of the 'Mme. Carnot' type; of a pale yellow colour.

To Chrysanthemum 'Maude du Cros' (votes, 16 for), from Mr. Bulli-

more, Edgware. A large flower of the Japanese section, florets moderately broad, very much twisted and of a pale yellow colour.

To Chrysanthemum 'Miss E. Holding' (votes, 15 for), from Mr. Seward, Hanwell. This is an incurved flower of good depth and of a silvery-mauve colour.

To *Erica gracilis nivalis* (votes, unanimous), from Messrs. Gregory, Sidcup. A white or only very faintly tinted variety of the well-known *Erica gracilis*.

To *Nephrolepis Westoni* (votes, unanimous), from Messrs. Cragg, Heston. The pinnæ are much divided and crested. The plant is erect in habit.

Other Exhibits.

Messrs. Low, Enfield, sent a collection of Carnations.

From Messrs. Bull, Chelsea, came a small selection of stove plants.

Messrs. Ladhams, Southampton, sent a very interesting group of *Lobelia syphilitica* seedlings.

J. Bryant, Esq., Sandown, I.W., sent seedling Chrysanthemum 'Miss Winnie Terry.'

G. Ferguson, Esq., Weybridge, sent seedling Chrysanthemums.

Messrs. Ware, Feltham, sent Nerines.

S. Morris, Esq., Thetford, sent Tree Carnations.

From Messrs. Whitmee, Swanley, came Chrysanthemum 'Mme. Jules Merman.'

Mr. Jones sent Chrysanthemum 'Lady Mary Conyers.'

Mr. Geiselbrecht, Eltham Road, sent a seedling Chrysanthemum.

Messrs. Sander sent *Begonia manicata cristata.*

Mr. G. Kromer, Croydon, sent *Griffinia hyacinthina.*

From Messrs. Bull, Chelsea, came *Aphelandra Blanchetiana.*

D. C. Guthrie, Esq., Northampton, sent *Begonia* 'Mrs. Mary Guthrie.'

A. James, Esq., Rugby, sent Carnation 'Sylvie.'

Floral Committee, November 10, 1903.

Mr. H. B. May in the Chair, and twenty members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Hill, Edmonton, for Ferns.

To Messrs. Wells, Redhill, for Chrysanthemums.

To Miss Adamson, Regent's Park (gr. Mr. G. Kelf), for flowering and foliage plants.

Silver Banksian Medal.

To Mr. Russell, Richmond, for ornamental shrubs.

To Messrs. Jas. Veitch, Chelsea, for Zonal Pelargoniums.

To G. Ferguson, Esq., The Hollies, Weybridge (gr. Mr. T. W. Smith), for a miscellaneous group.

To Mr. Prince, Longworth, for Roses.

To Lady Plowden, Aston Rowant (gr. Mr. Clarke), for Chrysanthemums.

Award of Merit.

To Chrysanthemum 'W. A. Etherington' (Jap.), from Messrs. Wells (votes, unanimous). A very massive flower of the 'Viviand Morel' type, with very long narrow petals of a soft pink, with silvery-white centre.

To Chrysanthemum 'Kitty Bourne' (single), from Messrs. Wells (votes, 11 for, 1 against). A plant of dwarf sturdy habit, and very free-flowering. Flowers of medium size with a double row of narrow bright yellow petals.

To *Nerine* 'Mrs. Moore,' from J. T. Bennett-Poë, Esq., V.M.H., Homewood, Cheshunt (gr. Mr. Downes) (votes, 8 for, 4 against). This plant carried a very tall scape with a very full corymb of rosy-crimson flowers, with long undulating segments.

To *Nerine* 'Miss Woolward' from J. T. Bennett-Poë, Esq. (votes, 13 for). A fine large flower with broad segments, rosy-pink in colour, with a broad line of deep crimson running down the centre of each segment.

Other Exhibits.

Messrs. Ware, Feltham, sent a collection of herbaceous plants.

From Mr. Reuthe, Keston, came a small but pretty collection of Nerines.

Messrs. Bull, Chelsea, sent a small collection of stove plants.

Messrs. Cutbush, Highgate, sent a collection of alpines.

From Messrs. Cheal, Crawley, came a collection of coloured foliage.

Mr. Ambrose, Cheshunt, sent a miscellaneous group.

Messrs. Clibran, Altrincham, sent single Chrysanthemums.

From Mr. Dean, Cassiobury Park, Watford, came Chrysanthemum 'Distinction.'

Messrs. Jas. Veitch, Chelsea, sent a very remarkable collection of leaves from their new Chinese vines, showing the marvellously vivid autumn coloration.

Messrs. Hill sent *Asplenium nidus corrugatum.*

From Messrs. Ware came *Linaria triornithophora*, *Nerine* 'Mrs. Mercer,' *Eccremocarpus scaber roseus*, and *Pentstemon lævigatus* var. *Digitalis.*

E. A. Bowles, Esq., Waltham Cross, sent three varieties of *Crocus.*

Mr. Carpenter, Byfleet, sent Chrysanthemum 'Mrs. James Dunn.'

FLORAL COMMITTEE, NOVEMBER 24, 1903.

Mr. H. B. MAY in the Chair, and twenty-four members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Jas. Veitch, Chelsea, for winter-flowering Begonias.

Silver-gilt Banksian Medal.

To Messrs. Hill, Edmonton, for Ferns.

To Messrs. Cannell, Swanley, for Chrysanthemums, Begonias, and Pelargoniums.

Silver Flora Medal.

To J. B. Hankey, Esq., Fetcham (gr. W. Higgs), for incurved Chrysanthemums.

To Mr. Russell, Richmond, for hardy shrubs.

Silver Banksian Medal.

To Messrs. Cripps, Tunbridge Wells, for *Euphorbia pulcherrima.*

To Messrs. Cutbush, Highgate, for Carnations and alpine plants.

To Messrs. Wells, Redhill, for Chrysanthemums.

Award of Merit.

To Chrysanthemum 'Dorothy Pywell' (votes, unanimous), from Mr. Seward, Hanwell. A large massive flower of the Japanese section, with long narrow florets, creamy-white, with a suffusion of very pale yellow in the centre.

To Chrysanthemum 'Mrs. J. Dunn' (votes, unanimous). A large massive flower of the Japanese section, with long broad florets, a pure white, resembling 'T. S. Vallis.'

To Chrysanthemum 'Lady Cranston,' from R. C. Murray, Esq., Edinburgh (votes, unanimous). A sport from 'Mrs. Barkley, which it much resembles; very long white florets, with a suffusion of soft pink in the centre.

Other Exhibits.

Mrs. Bayldon, Oaklands, Dawlish, sent spikes of *Buddleia madagascariensis*, it was thought to be the first time this species had flowered in the open air in England.

Messrs. Bull, Chelsea, sent *Epiphyllum delicatum.*

Messrs. Barr, Covent Garden, sent flowering bulbous plants.

Mr. Reuthe, Keston, sent Nerines.

From J. B. Fortescue, Esq., came Chrysanthemum 'Dorothy Fortescue.' said to have been brought from the Japanese Emperor's garden.

Major Hibbert, Rugby, sent Carnation 'Mrs. Hibbert.'

Admiral C. F. Walker, R.N., Beverley (gr. Mr. G. Davison), sent single Chrysanthemum 'Beverlac.'

From Messrs. Cannell, Swanley, came Chrysanthemum 'Gratianapolis.'

Lady Wantage, Lockinge (gr. Mr. W. Fyfe), sent single Chrysanthemums.

From Messrs. Peed, West Norwood, came single Chrysanthemum 'Pink Pet.'

FLORAL COMMITTEE, DECEMBER 15, 1903.

Mr. W. MARSHALL in the Chair, and twenty-four members present.

Awards Recommended :—

Gold Medal.

To Messrs. Ware, Feltham, for a magnificent group of alpines and rock plants.

Silver-gilt Flora Medal.

To Lord Aldenham, Elstree (gr. Mr. Beckett), for deciduous trees and shrubs.

To Messrs. Jas. Veitch, Chelsea, for winter-flowering Begonias.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for conifers, evergreen climbers, and alpine plants.

Silver Flora Medal.

To Messrs. Cannell, Swanley, for Zonal Pelargoniums.

To Messrs. Bull, Chelsea, for Palms.

Silver Banksian Medal.

To Messrs. Rochford, Broxbourne, for Crotons.

To Messrs. Wells, Redhill, for Chrysanthemums.

Award of Merit.

To Chrysanthemum 'Allman's Yellow,' from Mr. Thos. Allman, Dartford (votes, unanimous). A decorative variety of dwarf habit, free-flowering, medium-sized flowers with reflexed florets of a rich golden-yellow colour. It was considered to possess great merit as a late market variety.

To *Croton turnfordiensis*, from Messrs. Rochford, Broxbourne (votes, unanimous). A very striking variety, of good habit, with long broad leaves, the centres of which were of a lemon-yellow colour, and the margins a deep bronzy-green; the midribs, stems, and petioles were also yellow.

Other Exhibits.

Mr. Hemming, Alexandra Palace, sent Chrysanthemums.

Mr. Russell, Richmond, sent hardy evergreen plants.

From Messrs. Cragg, Heston, came Chrysanthemum 'Heston White,' a sport from 'Framfield Pink.'

Mr. Hamlin, Worthing, sent a sport from Chrysanthemum 'Mme. Ryhmer.'

From Mr. Weeks, Thrumpton Hall, Derby, came Chrysanthemum 'Weeks's Crimson.'

Mr. John Robson, Altrincham, sent *Bouvardia* 'Mrs. McCallick.'

From Messrs. Low, Enfield, came *Graptophyllum hortense*.

E. A. Tate, Esq., Alleyn Park, Dulwich (gr. Mr. Welling), sent Tree Carnation 'Edward Smith.'

ORCHID COMMITTEE.

Temple Show, May 26, 1903.

Mr. H. J. Veitch in the Chair, and thirty members present.

The Cups and Medals awarded by the Council will be found on page cviii.

Awards Recommended :—

First-class Certificate.

To *Odontoglossum crispum Grairianum* (votes, unanimous), from Norman Cookson, Esq., Wylam (gr. Mr. Chapman). Flowers almost wholly brownish-rose, margins white, with a few white lines running into the colour. (Fig. 186.)

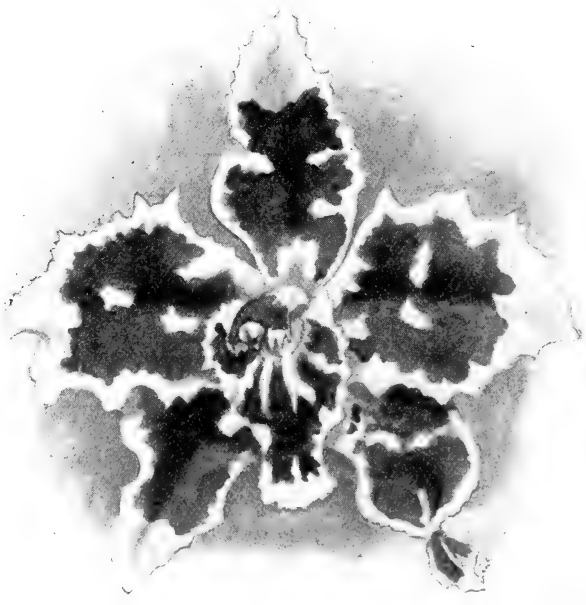


Fig. 186.—Odontoglossum crispum Grairianum. (*Journal of Horticulture.*)

Odontoglossum × *Wilckeanum venerandum* (votes, unanimous), from M. Vuylsteke, Ghent. Sepals and petals French-white, spotted with light brown; lip white, with yellow crest and reddish markings. (Fig. 187.)

To *Odontoglossum* × *ardentissimum exquisitum* (votes, unanimous), from M. Vuylsteke. Segments mauve-purple, with fringed white margins.

To *Vanda tricolor tenebrosa* (votes, unanimous), from M. Draps-Dom, Brussels. A very handsome variety, with yellow sepals and petals marked with chestnut-red. Labellum rose-crimson. (Fig. 188.)

To *Cattleya* × *Whitei magnifica* (*Warneri* × *Schilleriana*) (votes

unanimous), from Sir F. Wigan, Bart. (gr. Mr. Young). Flowers large, purplish-rose, with yellow markings on the base of the lip. (Fig. 189.)

To *Lælio-Cattleya* × *Fascinator splendens* (*C. Schroderæ* × *L. purpurata*) (votes, unanimous), from Messrs. Charlesworth, Bradford. Sepals and petals white, front of lip ruby-purple. (Fig. 190.)

Award of Merit.

To *Schomburgkia Galeottiana*, A. Rich. (votes, unanimous), from the Hon. W. Rothschild, M.P. (gr. Mr. Hill). A fine specimen, described

Fig. 187.—Odontoglossum Wilckeanum venerandum. (*The Garden.*)

in *Ann. Sc. Nat.*, ser. iii., vol. iii. (1845), p. 23, and erroneously figured in *Bot. Mag.* t. 4476 as *Schomburgkia tibicinis grandiflora*. Flowers with all the segments broader than in *S. tibicinis*; only slightly wavy at the margins, and of a purple-tinted rose-colour, with red and yellow markings on the side-lobes of the lip, the small, emarginate front lobe of which is a good distinguishing feature.

To *Odontoglossum* × *ardentissimum numosum* (votes, 13 for, 3 against) from M. Hye de Crom, Ghent (gr. Mr. Coen). Flowers white, handsomely marked with mauve-purple.

To *Odontoglossum* × *ardentissimum concinnum superbum* (votes,

unanimous), from M. Vuylsteke. Flowers white, heavily marked with mauve-purple; petals fringed.

To *Odontoglossum* × *Vuylstekei exquisitum* (votes, unanimous), from M. Vulysteke. Flowers light chestnut-red, with white margin to all the segments.

To *Odontoglossum crispum* 'Diana' (votes, unanimous) from Messrs. McBean, Cooksbridge. One of the largest of the unspotted forms. Flowers white, with a rose tint on the sepals.

To *Phaius* × *Chapmanii* ('Phœbe' × *Humblotii*) (votes, unanimous), from Norman Cookson, Esq. Flowers light rose-pink, with reddish markings on the side lobes of the lip, crest yellow.

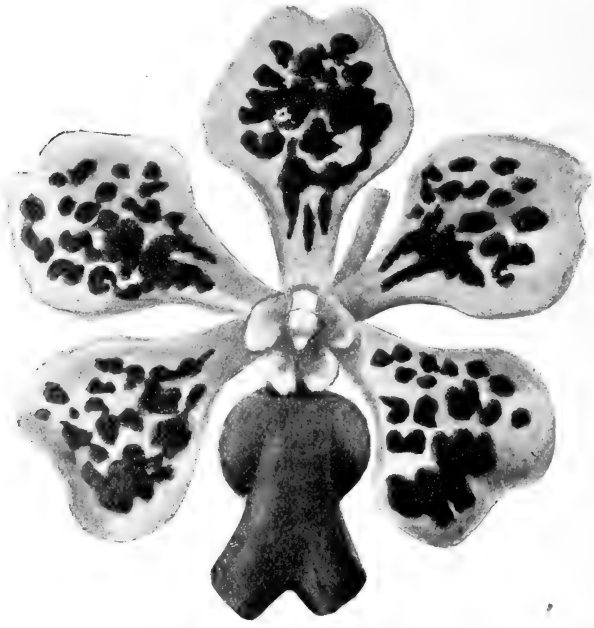


Fig. 188.—Vanda tricolor tenebrosa. (*Journal of Horticulture.*)

To *Lælio-Cattleya* × *Canhamiana* 'Rex' (*L. purpurata* × *C. Mossiæ* (votes, unanimous), from Sir F. Wigan, Bart. Sepals and petals white; lip ruby-purple, with white margin.

To *Vanda* × 'Marguerite Maron' (*suavis* × *teres*) (votes, unanimous) from M. Maron, Brunoy. A singular hybrid, with characters intermediate between the widely-separated species used in its production. Habit of *V. teres*, but much larger in growth, the fleshy leaves laterally compressed. Flowers nearest to those of *V. teres*. Sepals and petals pale rose. Lip rose-colour, with reddish markings on the side-lobes, and ruby-red apex.

To *Brasso-Cattleya* × *striata* (*Brassavola fragrans* × *Cattleya Mossiæ* (votes, unanimous), from Messrs. Charlesworth. Sepals and petals narrow, rose-tinted. Lip large, veined and striped with dark rose.

To *Odontoglossum crispum* 'The Kaiser' (votes, unanimous), from Messrs. Charlesworth. Flowers white, heavily blotched with purple.

To *Lælio-Cattleya* × *Fascinator nobilior* (votes, unanimous), from Messrs. Charlesworth. Sepals and petals blush white, front of lip soft rose.

Fig. 189.—Cattleya Whitei magnifica. (*Journal of Horticulture.*)

To *Odontoglossum crispum* 'Grand Duchess' (votes, 13 for) from Richard Ashworth, Esq. (gr. Mr. Pidsley). Flowers white, tinted with purple and spotted with claret-colour.

Botanical Certificate.

To *Eulophia Coleæ*, from Miss E. Cole, Newbury. A species with hard fleshy leaves, and upright spikes of small greenish flowers. This and a somewhat similar and equally remarkable plant—*Eulophia*

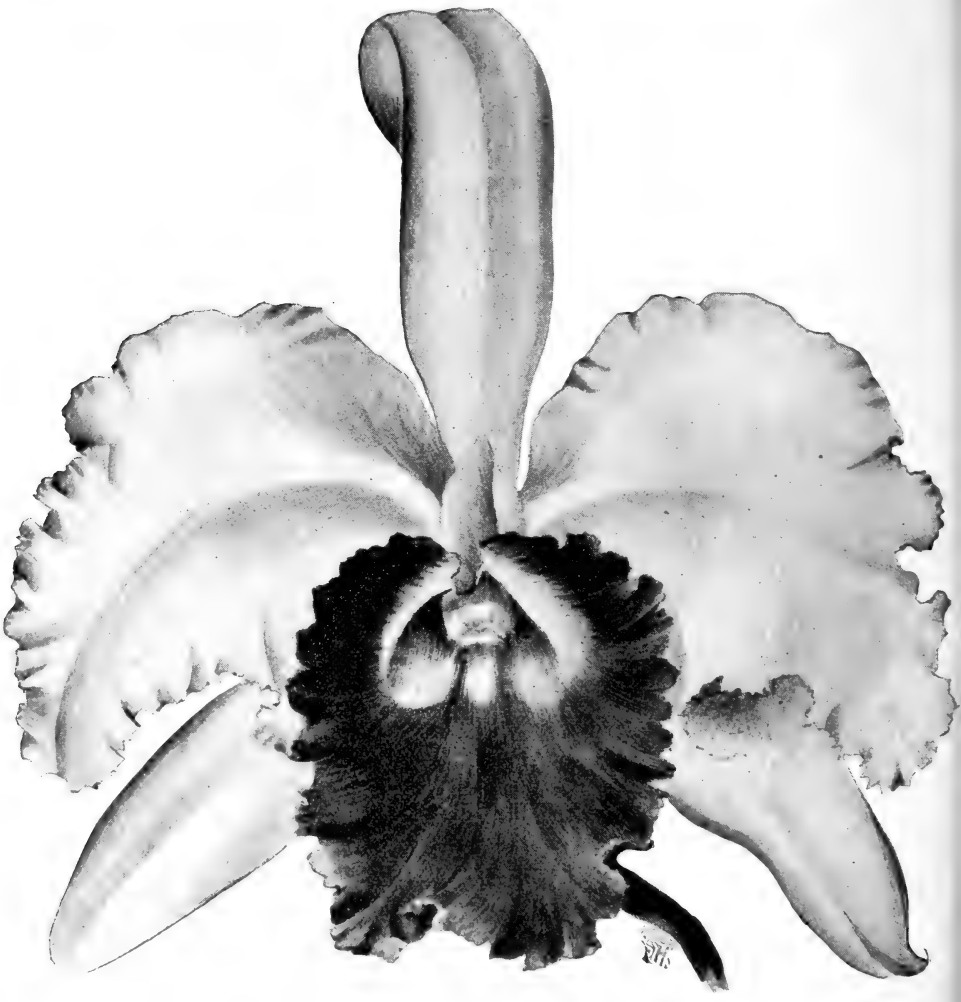


Fig. 190.—Lælio-Cattleya Fascinator splendens. (*The Garden.*)

Phillipsæ—were collected by Miss Cole on the Goolis range in Somaliland. They were found growing in the ground at an altitude of 4,000 to 5,000 ft.

Cultural Commendation.

To Mr. Young, gr. to Sir F. Wigan, Bart., for *Cymbidium Lowianum* with eleven spikes of flowers.

ORCHID COMMITTEE, JUNE 9, 1903.

Mr. H. J. VEITCH in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Baron Sir H. Schröder, Bart., Egham (gr. Mr. Ballantine), for a group of Orchids including *Cypripedium Stonei platytænium*, and some fine blotched forms of *Odontoglossum crispum*.

To Captain Holford, C.I.E., Westonbirt (gr. Mr. Alexander), for a group of Orchids.

To H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), for a group of Orchids.

FIG. 191.—PHAIUS × CHAPMANII SUPERBUS. (*Journal of Horticulture.*)

Silver Flora Medal.

To Messrs. J. Veitch, Chelsea, for a group of hybrid Orchids.

Silver Banksian Medal.

To Messrs. Williams, Holloway, for a group of Orchids.

First-class Certificate.

To *Phaius* × *Chapmanii superbus* ('Phœbe' × *Humblotii*) (votes, unanimous), from Norman Cookson, Esq. (gr. Mr. Chapman). A better variety of the hybrid which received an Award of Merit at the Temple Show. Sepals and petals cream-white tinged with rose; lip rose-purple, with red markings on the side-lobes. (Fig. 191.)

Award of Merit.

To *Odontoglossum crispum Truffautianum* (votes, unanimous), from Baron Sir H. Schröder, Bart. Flowers large, white, tinged with purple; the petals bearing clusters of reddish-purple blotches, and the sepals one large one of the same colour. (Fig. 192.)

To *Odontoglossum cordatum aureum* (votes, unanimous), from W. Thompson, Esq. (gr. Mr. Stevens). In this the brown marking of the type is suppressed and the flowers are wholly white and yellow.

To *Epi-Cattleya* × *matutina* (*C. Bowringiana* × *E. radicans*) (votes, unanimous), from Messrs. Jas. Veitch. Flowers lilac, tinted with salmon-

Fig. 192.—Odontoglossum crispum Truffautianum. (*The Garden.*)

colour, with a yellow ground-colour on the labellum, the form of which was different from the plant originally shown, and resembled *Epi-Cattleya* × 'Mrs. J. O'Brien.'

Botanical Certificate.

To *Oncidium triquetrum*, from H. T. Pitt, Esq. A dwarf species of the section *Equitantia*, from Jamaica. Flowers in slender sprays, whitish, stained and spotted with crimson.

Cultural Commendation.

To Mr. Alexander (gr. to Captain Holford), for a large and splendidly cultivated specimen of *Odontoglossum luteo-purpureum* with two spikes of over twenty flowers each.

To Mr. Stevens, gr. to W. Thompson, Esq., for a fine specimen of *Odontoglossum crispum* with several spikes.

To Mr. Stevens, for *Odontoglossum* × *crispo-Harryanum primulinum* with over forty flowers on a spike.

Other Exhibits.

F. Wellesley, Esq., Westfield (gr. Mr. Gilbert), showed *Cattleya Schilleriana* with six flowers on a spike, and other Orchids.

J. Wilson Potter, Esq. (gr. Mr. Young), sent *Odontoglossum crispum* 'Jeanette,' a good flower spotted with purple.

ORCHID COMMITTEE, HOLLAND HOUSE, JUNE 25, 1903.

Mr. H. J. VEITCH in the Chair, and eighteen members present.

The Cups and Medals awarded by the Council will be found at page cxviii.

Awards Recommended.

First-class Certificate.

To *Cattleya Mossiæ Alexandræ* (votes, unanimous), from Messrs. Sander, St. Albans. A fine pure white flower, with a slight tinge of rose-pink on the front of the lip.

To *Lælio-Cattleya* × *Martineti* 'Flambeau' (*L. tenebrosa* × *C. Mossiæ*) (votes, unanimous), from Messrs. Sander. Sepals and petals bright yellowish-red; lip veined with purple.

To *Cattleya* × *Roehrsiana* (*Mendelii* × *Hardyana*) (votes, unanimous), from Messrs. Sander. A fine flower with white ground-colour, the sepals and petals tinged and veined with purple, and the front of the lip dark crimson-purple.

To *Odontoglossum* × *Rolfeæ majesticum* (*Pescatorei* × *Harryanum*) (votes, unanimous), from Messrs. Sander. Flowers large, white, profusely marked with purple.

To *Cattleya Warneri alba* (votes, unanimous), from M. Peeters, Brussels. Flowers pure white, with dark yellow disc to the lip. (Fig. 193.)

Award of Merit.

To *Lælio-Cattleya* × *Martineti ochracea* (*L. tenebrosa* × *C. Mossiæ*) (votes, 8 for, 2 against), from Messrs. Sander. Sepals and petals yellow; lip pale rose, veined with purple.

To *Odontoglossum* × *ardentissimum Fascinator* (*Pescatorei* × *crispum* 'Franz Masereel') (votes, unanimous), from Messrs. Sander. Flowers of good form, white, with a large purple blotch on each segment.

Cultural Commendation.

To M. Peeters for *Cattleya Warneri alba* with five flowers on a spike.

To Mr. Denny, gr. to Sir W. Marriott, Bart., for *Disa* × 'Clio' with several fine spikes of flowers.

Other Exhibits.

Norman Cookson, Esq., showed *Odontoglossum crispum Sanderæ*, and *O. c.* 'Sibyl.'

Jeremiah Colman, Esq., staged an effective group of Orchids.

Messrs. Charlesworth exhibited a group of Orchids.

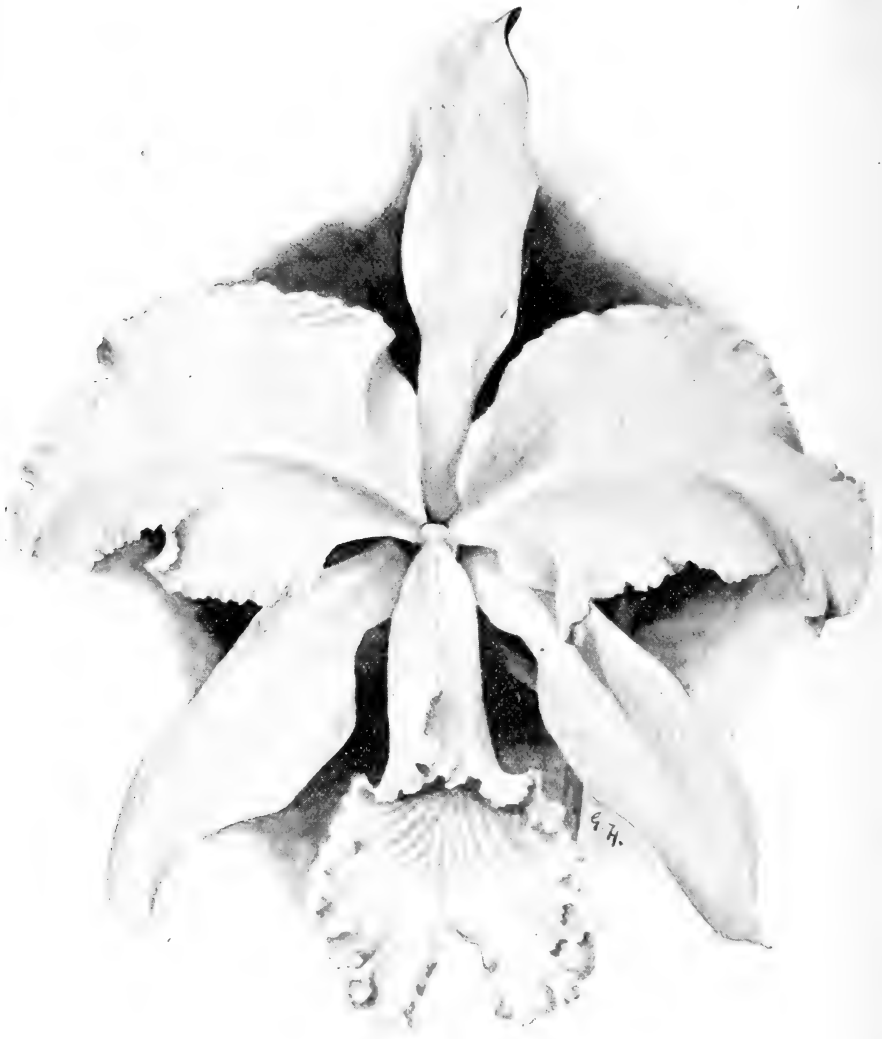


FIG. 193.—CATTLEYA WARNERI ALBA. (*The Garden.*)

Messrs. Hugh Low staged a group of Orchids.

Messrs. Jas. Veitch showed hybrid Lælio-Cattleyas.

Messrs. Williams showed a collection of Orchids.

Francis Wellesley, Esq., showed Lælio-Cattleyas &c.

ORCHID COMMITTEE, JULY 7, 1903.

Mr. HENRY LITTLE in the Chair, and ten members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Sander, for a group of Orchids, including a number of varieties of *Lælio-Cattleya* × *Martineti*.

Silver Banksian Medal.

To Sir F. Wigan, Bart. (gr. Mr. Young), for specimens of several species of Sobralias.

To Messrs. Bull for Ancectochili, Hæmarias, &c.

Other Exhibits.

Reginald Young, Esq., Liverpool (gr. Mr. Poyntz), showed a specimen of *Cypripedium* × 'Ultor' (*Lawrenceanum* ♀ *Sanderianum* ♂).

The Hon. W. Rothschild (gr. Mr. Hill) showed *Lælio-Cattleya* × 'Mauve Queen' Tring Park var. (*C. Warneri* × *L. crispa superba*). The original form was shown by Earl Cowper, Nov. 13, 1894.

ORCHID COMMITTEE, JULY 21, 1903.

Mr. H. J. VEITCH in the Chair, and thirteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Sander, St. Albans, for a group of hybrid Lælio-Cattleyas, &c.

First-class Certificate.

To *Lælio-Cattleya* × *bletchleyensis* 'Illuminator' (*L. tenebrosa* × *C. Warscewiczii*) (votes, unanimous), from Messrs. Sander. A very finely-coloured hybrid, with flowers having sepals and petals of an orange-salmon tint, with a purplish glow from the base. Lip dark velvety purple, with maroon veining.

Award of Merit.

To *Cypripedium* × 'Ultor' (*Lawrenceanum* ♀ *Sanderianum* ♂) (votes, unanimous), from Reginald Young, Esq., Liverpool (gr. Mr. Poyntz). Leaves light green, with dark green veining. Scape three-flowered. Flowers arranged as in *C. Sanderianum*. Upper sepal yellowish, with purple-dotted lines. Petals arched and decurved, six inches in length, yellowish, with warted purple spots on the lower halves, and rose on the apical portions; lip and staminode brownish-rose.

Botanical Certificate.

To *Cirrhæa Warreana*, from Messrs. Sander. A singular species with short pendulous racemes of clustered greenish flowers marked with purple.

Other Exhibits.

Messrs. Rochford, Cheshunt, sent white *Cattleya Mendelii*, and *C. Gaskelliana*.

J. Gurney Fowler, Esq., South Woodford (gr. Mr. Davis), sent an inflorescence of *Eulophiella Peetersiana*, and one of *Renanthera Storiei*.

Messrs. Hugh Low showed *Cattleya Mossiæ Wageneri* and *C. intermedia alba*.

Malcolm S. Cooke, Esq., Kingston Hill (gr. Mr. Buckell), showed a blotched form of *Odontoglossum crispum*.

Orchid Committee, August 4, 1903.

Mr. H. J. Veitch in the Chair, and thirteen members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. Sander, St. Albans, for a group of hybrid Orchids.

To Messrs. Cripps, Tunbridge Wells, for a group of *Disa grandiflora*.

Award of Merit.

To *Cattleya Warscewiczii* 'White Queen' (votes, 8 for, 4 against), from W. P. Burkinshaw Esq., Hessle (gr. Mr. Barker). Sepals and petals white; lip as in ordinary light-coloured varieties, rose-purple on the front lobe.

To *Cattleya* × 'Atalanta' *superba* (*Leopoldii* × *Warscewiczii*) (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. Flowers larger than the original form; purplish-rose, with fine purple veining and crimson-purple labellum. (Fig. 194.)

Botanical Certificate.

To *Angræcum Rothschildianum*, from the Hon. W. Rothschild, M.P. A very remarkable new species from the Victoria Nyanza district, the only other member of the section, *Angræcum Galeandræ*, Rchb. f., being known only by herbarium specimens. Plant with the habit of *A. bilobum*, but with a drooping raceme of flowers more nearly approaching those of *Aeranthes* in the short inflated-pointed spur to the lip. Flowers two inches across, sepals and petals white, with an emerald-green band up the middle; lip $1\frac{3}{4}$ inch long and nearly an inch broad. Front margined white, disc emerald-green, interior of spur blackish-purple, exterior brownish-green. Final third of an inch of the spur inflated, laterally compressed, and recurved at right angles.

Other Exhibits.

J. Gurney Fowler, Esq. (gr. Mr. Davis), showed *Lælia* × *Digbyano-purpurata* 'Edward VII.,' and a set of hybrids of *Cypripedium Rothschildianum*, &c.

Messrs. Hugh Low showed Orchids.

Messrs. Jas. Veitch sent *Lælio-Cattleya* × 'Issy,' and other hybrids.

Sir F. Wigan, Bart. (gr. Mr. Young), showed *Cattleya* × 'Mrs. Pitt.'

H. T. Pitt, Esq. (gr. Mr. Thurgood), showed hybrid Orchids.

ORCHID COMMITTEE, AUGUST 18, 1903.

Mr. HENRY LITTLE in the Chair, and fourteen members present.

Awards Recommended :—

Silver Flora Medal.

To Captain Holford C.I.E., Westonbirt (gr. Mr. Alexander), for a group of *Lælio-Cattleyas*, &c.

FIG. 194.—CATTLEYA 'ATALANTA' SUPERBA. (*Journal of Horticulture.*)

To H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), for a group of Orchids.

To Messrs. Charlesworth, Bradford, for hybrid Orchids.

To Messrs. Sander, St. Albans, for a group of Orchids.

To Messrs. Stanley, Ashton, Southgate, for Oncidiums, Cattleyas, &c.

Award of Merit.

To *Lælia* × 'Iona' Southgate var. (*pumila Dayana* × *tenebrosa*) (votes unanimous) from Messrs. Stanley, Ashton. A finely formed flower with

Fig. 195.—Lælia 'Iona' Southgate var. (*The Garden.*)

sepals and petals purplish-rose. Labellum dark ruby-purple with claret veining. (Fig. 195.)

Cultural Commendation.

To Mr. G. Matthews, gr. to Lord Auckland, Kitley, for an inflorescence of *Oncidium luridum guttatum* 7 feet 6 inches long, and bearing 230 flowers.

To Mr. Alexander, gr. to Captain Holford, for *Lælio-Cattleya* × *callistoglossa excelsa* with twelve fine flowers.

Other Exhibits.

Francis Wellesley, Esq. Westfield (gr. Mr. Hopkins), showed *Lælia* × 'Olivia' *alba* and other hybrids.

Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound), sent a peculiar form of *Lælio-Cattleya* × *elegans*.

J. Bradshaw, Esq., Southgate (gr. Mr. Whitelegge), sent *Cattleya* × 'Comet' (*Warneri* × *aurea*).

Fred. Hardy, Esq., Ashton-on-Mersey (gr. Mr. Stafford), sent *Sophro-Cattleya* × 'Geo. Hardy' (*S. grandiflora* × *C. Acklandiæ*).

W. M. Appleton, Esq., Weston-super-Mare, showed hybrid Cypripediums.

C. L. N. Ingram, Esq., Elstead (gr. Mr. Bond), sent *Cattleya* × *Epicasta fulgens*.

C. J. Lucas, Esq., Warnham Court (gr. Mr. Duncan), showed *Lælio-Cattleya* × *bletchleyensis* and two hybrid Cypripediums.

ORCHID COMMITTEE, SEPTEMBER 1, 1903.

Mr. H. J. VEITCH in the Chair, and nine members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Charlesworth, Heaton, Bradford, for a group of Orchids.

Silver Banksian Medal.

To Messrs. Sander, St. Albans, for a group of Orchids.

First-class Certificate.

To *Cattleya* × *Pittiana* 'J. Wilson Potter's var.' (*granulosa Schofieldiana* × *Dowiana aurea*) (votes, unanimous) from J. Wilson Potter, Esq., Croydon (gr. Mr. Young). Flowers large, of *C. granulosa* form, but with broader segments. Sepals and petals bronzy-yellow, tinged with rose. Lip marked with orange colour in the centre, front purplish-ruby-red, margin fimbriated, blush-white. (Fig. 196.)

Award of Merit.

To *Cattleya* × *exquisita* (*luteola* × *Parthenia* var. 'Prince of Wales'). Habit of plant and form of flower similar to a small *C. Mossiæ*. Sepals and petals white. Disc of lip orange, front marbled with bright purple.

Other Exhibits.

Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound), showed a fine form of *Lælio-Cattleya* × 'Henry Greenwood,' *L.-C.* × *bletchleyensis*, and *Odontoglossum bictoniense*.

J. Gurney Fowler, Esq. (gr. Mr. Davis), showed a fine specimen of *Catasetum Russellianum*.

W. Cobb, Esq. (gr. Mr. Howes), sent an unspotted form of *Coryanthes maculata.*

Messrs. Williams, Holloway, staged a group of Orchids.

FIG. 196.—CATTLEYA × PITTIANA, WILSON-POTTER'S VAR. (*Journal of Horticulture.*)

Messrs. Sander showed *Lælio-Cattleya* × 'Britannia,' *L.-C.* × *Canhamiana* × *C. Warscewiczii,* and other hybrids.

ORCHID COMMITTEE, SEPTEMBER 15, 1903.

Mr. H. J. VEITCH in the Chair, and eighteen members present.

Awards Recommended:—

Gold Medal.

To Messrs. Charlesworth, Heaton, Bradford, for a fine display of hybrid Orchids.

Silver Floral Medal.

To H. T. Pitt, Esq., Stamford Hill (gr. Mr. Thurgood), for a group of Orchids.

To Messrs. Sander, for hybrid Orchids.

To Messrs. Hugh Low, for a group of Orchids.

Silver Banksian Medal.

To Sir Trevor Lawrence, Bart., Burford (gr. Mr. White), for Orchids of great botanical interest.

First-class Certificate.

To *Zygopetalum* × *Roeblingianum* (*rostratum* × *maxillare Gautieri* (votes, unanimous), from C. G. Roebling, Esq., Trenton, New Jersey, U.S.A. (gr. Mr. Clinkaberry), in whose garden it was raised. The habit of the plant resembled that of *Z. maxillare*, but the form of the flowers

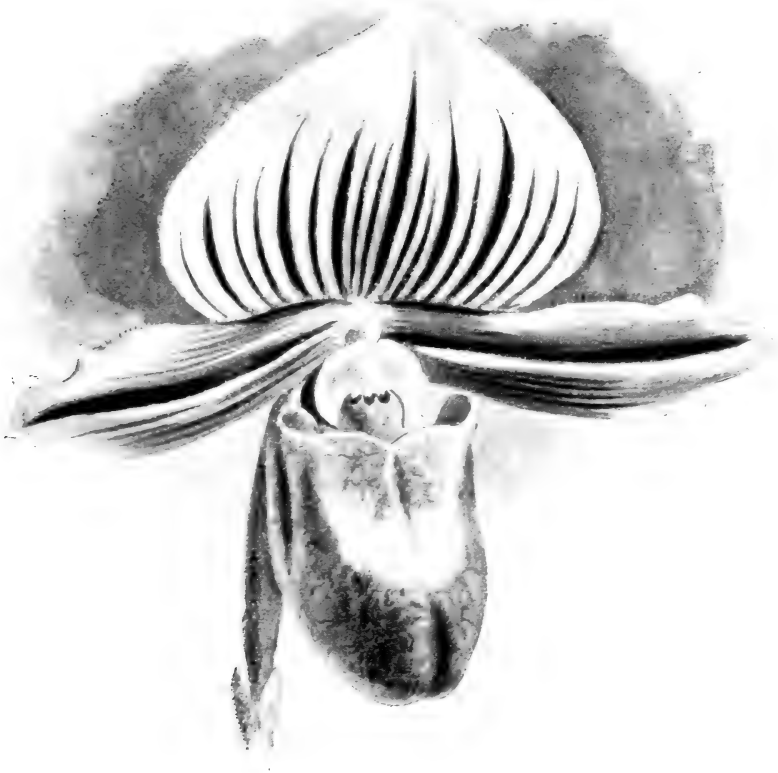


Fig. 197.—Cypripedium Lawrenceanum Gratrixianum. (*Journal of Horticulture.*)

partook more of *Z. rostratum*. Inflorescence erect, flowers several on the upper part of the spike; sepals whitish-emerald-green with a purplish band up the middle; petals nearly white, marked with purple on the inner halves. Lip large, violet at base, white in front, with bright purplish-rose markings.

The plant was afterwards sold by auction at Messrs. Protheroe and Morris's Rooms by order of the owner and was bought for fifty guineas by Sir F. Wigan, Bart., the amount, by Mr. Roebling's order, being handed to the Royal Horticultural Society as a donation towards the New Hall now in course of erection.

Award of Merit.

To *Cypripedium Lawrenceanum Gratrixianum* (votes, unanimous), from T. M. Crook, Esq., Preston (gr. Mr. Parks). Flowers emerald-green and white, but differing from *C.* × *Lawrenceanum Hyeanum* in having a slight rose tint on the petals and lip. (Fig. 197.)

To *Cypripedium* × 'Mrs. Alfred Fowler' 'Rappart's var.' (*Lathamianum* × *Charlesworthii* (votes, 11 for, 2 against), from T. M. Crook, Esq. Dorsal sepal white tinged and veined with rose. Petals and lip brownish-purple.

Botanical Certificate.

To *Polystachya Buchanani*, var. *viride*, from Sir Trevor Lawrence, Bart. A pretty variety with emerald-green flowers with white labellums. Sent home by Lieut. C. T. Lawrence from West Africa. The type was collected on the Zambesi.

Other Exhibits.

Messrs. Jas. Veitch showed hybrid Orchids.

Francis Wellesley, Esq., showed *Lælio-Cattleya* × *Wellsiana magnifica*.

Baron Sir H. Schröder, Bart. (gr. Mr. Ballantine), showed *Sophro-Cattleya* × 'Queen Empress.'

W. Thompson, Esq. (gr. Mr. Stevens), sent *Odontoglossum* × 'Juno' (*luteo-purpureum sceptrum* × *cirrhosum*).

C. H. Feiling, Esq. (gr. Mr. Stocking), sent five hybrids of *Cypripedium Rothschildianum*.

T. M. Crook, Esq., showed *Cypripedium* × 'Lord Derby' with three spikes of flowers from one growth.

Orchid Committee (Chiswick), September 29, 1903.

Mr. H. J. Veitch in the Chair, and eleven members present.

Exhibits.

Norman Cookson, Esq., Wylam (gr. Mr. Chapman), showed *Cattleya* × 'Lord Rothschild, Oakwood var.' (*Gaskelliana* × *Dowiana aurea*); and *Cypripedium* × *Nandii* (*callosum* × *Tautzianum*).

Henry Little, Esq., Baronshalt, Twickenham (gr. Mr. Howard), showed *Cattleya* × *Wendlandii* 'Little's var.' (*Bowringiana* × *Warscewiczii*) with a fine four-flowered inflorescence; and *Cattleya* × *Hardyana* 'Baronshalt var.'

W. P. Burkinshaw, Esq., Hull (gr. Mr. Barker), sent *Cattleya* × *Hardyana* 'Hessle var.' of excellent merit.

H. S. Goodson, Esq., Putney (gr. Mr. Chown), sent *Cypripedium* × 'H. S. Goodson' (× *Swinburnei* × 'T. B. Haywood'). Flower approaching *C.* × *Swinburnei* in form and colour.

ORCHID COMMITTEE, OCTOBER 13, 1903.

Mr. H. J. VEITCH in the Chair, and nineteen members present.

Awards Recommended.

Silver-gilt Flora Medal.

To Messrs. Sander, St. Albans, for a group of Orchids.

Silver Flora Medal.

To H. T. Pitt, Esq. Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a group of Orchids.

FIG. 198.—LÆLIO-CATTLEYA 'NORBA' SUPERBA. (*Journal of Horticulture.*)

To Messrs. Jas. Veitch, for varieties of *Cattleya labiata*, and hybrid Orchids.

Silver Banksian Medal.

To Messrs. Hugh Low, for a collection of Orchids.

Award of Merit.

To *Lælio-Cattleya* × 'Norba' *superba* (*C. Mossiæ* × *L. xanthina*) (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. Flowers with canary-coloured sepals, primrose petals, and chrome-yellow lip, with a rosy-lilac front lobe. (Figs. 198, 199.)

Cultural Commendation.

To Mr. Hill, gr. to Lord Rothschild, Tring Park, for a noble specimen of *Lælio-Cattleya* × 'Nysa' *superba* (*L. crispa* × *C. Warscewiczii*),

FIG. 199.—LÆLIO-CATTLEYA 'NORDA' SUPERBA.

with eleven fine flowers and three buds. The plant had also matured a seed ovary.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent *Lælia* × *juvenilis superba* (*Perrinii* × *pumila*).

M. Zollinger-Jenny, Zurich, sent *Cypripedium* × ('Victoria Mariæ' × *Spicerianum*).

De B. Crawshay, Esq. (gr. Mr. Stables), showed a typical white form of *Odontoglossum crispum*, which had been raised from seeds of *O. crispum* × *O.* × *Wilckeanum*.

J. Forster Alcock, Esq., Northchurch, sent a finely-flowered plant of *Odontoglossum grande*.

ORCHID COMMITTEE, OCTOBER 27, 1903.

Mr. H. J. VEITCH in the Chair, and twenty-two members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Baron Sir H. Schröder, Bart. (gr. Mr. Ballantine), for a very rare collection of Orchids.

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound), for a fine group of Orchids.

To J. Bradshaw, Esq. Southgate (gr. Mr. Whitelegge), for a group of varieties of *Cattleya labiata*, hybrid, and other Orchids.

To Messrs. Jas. Veitch, Chelsea, for a group of *Cattleya labiata* and hybrid Orchids.

To Messrs. Charlesworth, Bradford for a fine group of Orchids.

Silver Flora Medal.

To Captain Holford, C.I.E., Westonbirt (gr. Mr. Alexander), for an excellent group of Orchids.

To Messrs. Sander, St. Albans, for a group of Orchids.

To Mr. Cypher, Cheltenham, for a group of Cypripediums, &c.

To Messrs. Hugh Low, Enfield, for a group of Orchids.

Silver Banksian Medal.

To J. Gurney Fowler, Esq., South Woodford (gr. Mr. Davis), for a floral design made up of five racemes of *Arachnanthe Lowii*, each several feet in length, arranged with *Asparagus Sprengeri*. The spikes were the produce of one specimen.

To H. S. Goodson, Esq., Putney, for a group of Orchids.

First-class Certificate.

To *Lælio-Cattleya* × *Gottoiana regalis* (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. White). A very finely-coloured form. Sepals and petals purplish-rose; lip claret-crimson.

To *Lælio-Cattleya* × *Haroldiana* 'John Bradshaw' (*L. tenebrosa* ×

C. × *Hardyana*) (votes, unanimous), from J. Bradshaw, Esq., Southgate (gr. Mr. Whitelegge). A large flower. Sepals Indian-yellow, tinged with rose; petals rose-purple, with yellow veining; lip crimson-purple, with gold veining at the base. (Fig. 201.)

To *Phaio-Cymbidium* × *chardwarense* (*P. grandifolius* × *C. giganteum*) (votes, unanimous), from G. F. Moore, Esq., Bourton-on-the-Water (gr. Mr. Page). A very remarkable hybrid about whose origin the raiser has no doubt. Growth much resembling *Phaius grandifolius*, but with a tendency to elongate the pseudo-bulbs, and some other differences. Flowers on stout stems 3 feet in height. Sepals and petals yellow, tinged with copper-colour; lip reddish-brown, with yellow veining. The

Fig. 200.—Phaio-Cymbidium × chardwarense. (*Journal of Horticulture.*)

remainder of the seedlings are still on the plant of *Cymbidium giganteum* where they were sown. (Fig. 200.)

Award of Merit.

To *Cattleya* × *Gautheriana* (*Schroderæ* × *guttata Leopoldii*) (votes, unanimous), from Baron Sir H. Schröder, Bart. (gr. Mr. Ballantine). Flowers in erect spikes as in *C. Leopoldii*; cream-white, tinged with rose, the front of the labellum pink.

To *Cattleya* × 'Fabia Mary de Wavrin' (*labiata alba* × *Dowiana aurea*) (votes, 13 for), from Monsieur Peeters, Brussels. Sepals and petals blush-white; lip rose, with yellow veining at the base.

Botanical Certificate.

To *Cœlogyne fuscescens*, from Sir Trevor Lawrence, Bart. Flowers in racemes, whitish, with brown markings on the lip.

FIG. 201.—LÆLIO-CATTLEYA HAROLDIANA 'JOHN BRADSHAW.' (*The Garden.*)

(*To face p.* ccxlviii.)

Other Exhibits.

Mrs. T. Fielden, Tadcaster (gr. Mr. Clayton), showed *Cattleya labiata Fieldenii.*

Mr. H. A. Tracy showed *Cattleya labiata*, 'H. Rider Haggard.'

H. J. Elwes, Esq., Colesborne, showed *Arundina chinensis* and other Orchids.

ORCHID COMMITTEE, NOVEMBER 10, 1903.

Mr. H. J. VEITCH in the Chair, and seventeen members present.

Awards Recommended:—

Silver Flora Medal.

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound), for a group of Orchids.

To J. Bradshaw, Esq., The Grange, Southgate (gr. Mr. Whitelegge), for a group of *Cattleya labiata*, and other Orchids.

To Messrs. Jas. Veitch, Chelsea, for a group of Cypripediums, Cattleyas, Lælio-Cattleyas, &c.

To Messrs. Charlesworth, Heaton, for a group of hybrid Orchids.

To Messrs. Sander, St. Albans, for a group of Orchids.

To Monsieur Peeters, Brussels, for a group of hybrid Orchids.

To Messrs. Hugh Low, Enfield, for a group of Orchids.

Silver Banksian Medal.

To H. L. Bischoffsheim, Esq., Stanmore (gr. Mr. Ellis), for a group of Odontoglossums, Cattleyas, &c.

To R. Clayton, Esq., Wylam-on-Tyne (gr. Mr. Bean), for finely-grown plants of *Calanthe* × 'Kenneth' and *C.* × 'Wm. Murray.'

First-Class Certificate.

To *Lælio-Cattleya* × *bletchleyensis* 'Ruby King' (*L. tenebrosa* × *C. Warscewiczii*), from Baron Sir Henry Schröder, Bart., The Dell, Egham (gr. Mr. Ballantine). A very large and handsome flower. Sepals and petals rose-purple, the sepals tinged golden-yellow. Lip ruby-crimson, changing to light purple towards the front.

To *Cattleya* × *Hardyana albens* (votes, unanimous), from Monsieur Peeters. Sepals and petals white, slightly tinged with rose. Lip crimson, with gold veining at the base and two whitish blotches, one on each side.

Award of Merit.

To *Cymbidium* × *Wiganianum* (*eburneum* × *Tracyanum*) (votes, unanimous), from Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. Young). Flowers as large as those of *C. Tracyanum*, cream-white, with faint purple markings on the sepals and petals, and distinct brown markings on the lip.

To *Cypripedium* × 'Ville de Paris' (? *Sallieri* × *insigne* 'Harefield Hall' variety) (votes, unanimous), from Francis Wellesley, Esq., Westfield (gr. Mr. Hopkins). A massive flower, yellow, profusely spotted with dark brown, and with white upper half to the dorsal sepal. (Fig. 202.)

To *Cypripedium* × *fulshawense* (*Boxallii* × *insigne* 'Harefield Hall'

variety) (votes, unanimous), from Elijah Ashworth, Esq., Harefield Hall, Wilmslow (gr. Mr. Holbrook). Resembling *C. insigne* 'Harefield Hall,' but darker in colour and showing distinct traces of *C. Boxallii*.

FIG. 202.—CYPRIPEDIUM 'VILLE DE PARIS.'

To *Lælio-Cattleya* × *Wrigleyi* (*L. anceps* × *C. Bowringiana*) (votes, unanimous), from Messrs. James Veitch, and Monsieur Peeters. Flowers produced as in *L. anceps*, but larger, purplish-rose with claret-rose labellum, the plant from Messrs. Veitch having a white base to the lip.

To *Cattleya* × 'St. Gilles' (× *Patrocini* × *Dowiana aurea*) (votes, unanimous), from Monsieur Peeters. Flowers rose-crimson, darker on the lip and with golden veining on the base.

Cultural Commendation.

To Mr. Bean, gr. to R. Clayton Esq., for finely-grown Calanthes.

Other Exhibits.

Norman C. Cookson, Esq., (gr. Mr. Chapman), showed the finely-spotted *Odontoglossum crispum Elamii.*

W. Thompson, Esq. (gr. Mr. Stevens), sent his fine yellow-blotched *Odontoglossum* × *waltonense*, and *O.* × *loochristyense tenebrosum.*

Messrs. Fisher, Son, and Sibray, Handsworth, showed *Cypripedium* × 'Memnon' (*Charlesworthii* × *Spicerianum*).

Messrs. McBean, Cooksbridge, sent *Cypripedium* × 'Violetta' (*Charlesworthii* × *venustum*).

Francis Wellesley, Esq., showed two yellow forms of *Cypripedium insigne.*

G. F. Moore, Esq., sent forms of *Cypripedium insigne.*

Sir Frederick Wigan, Bart., showed *Cypripedium* × 'Muriel Hollington' and *Cattleya labiata Amesiana.*

ORCHID COMMITTEE, NOVEMBER 24, 1903.

Mr. H. J. VEITCH in the Chair, and nineteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Captain Holford, C.I.E., Westonbirt (gr. Mr. Alexander), for large specimen Cypripediums.

To Messrs. Sander, St. Albans, for hybrid Orchids.

To Messrs. Cypher, Cheltenham, for Cypripediums.

Silver Flora Medal.

To F. A. Rehder, Esq., Gipsy Hill (gr. Mr. Norris), for Cypripediums.

To Messrs. Charlesworth, Bradford, for hybrid Orchids.

Silver Banksian Medal.

To Messrs. Hugh Low, Enfield, for a group of Orchids.

To Mr. H. Whateley, Kenilworth, for Cypripediums.

Award of Merit.

To *Lælio-Cattleya* × 'Cassiope' Westonbirt var. (*L. pumila* × *L.-C.* × *exoniensis*) (votes, unanimous), from Captain Holford. Sepals and petals rosy-lilac; lip dark purple. (Fig. 203.)

To *Cypripedium* × *Leeanum Staffordianum* (*insigne Maulei* × *Spicerianum*) (votes, 12 for, 3 against) from Captain Holford. Flowers large, yellow, tinged with red-brown. Upper sepal white, with greenish base and purple lines.

To *Cypripedium* × 'Queen of Italy' (*insigne Sanderæ* × *Godefroyæ leucochilum*) (votes, unanimous), from Messrs. Charlesworth. Flowers resembling those of *C.* × 'Venus'; cream-white, with minute purple spots on the petals and lower part of the dorsal sepal.

Cultural Commendation.

To Mr. H. Alexander, gr. to Captain Holford, for *Cypripedium insigne* 'Harefield Hall' var. with eight flowers. Grown from a small plant.

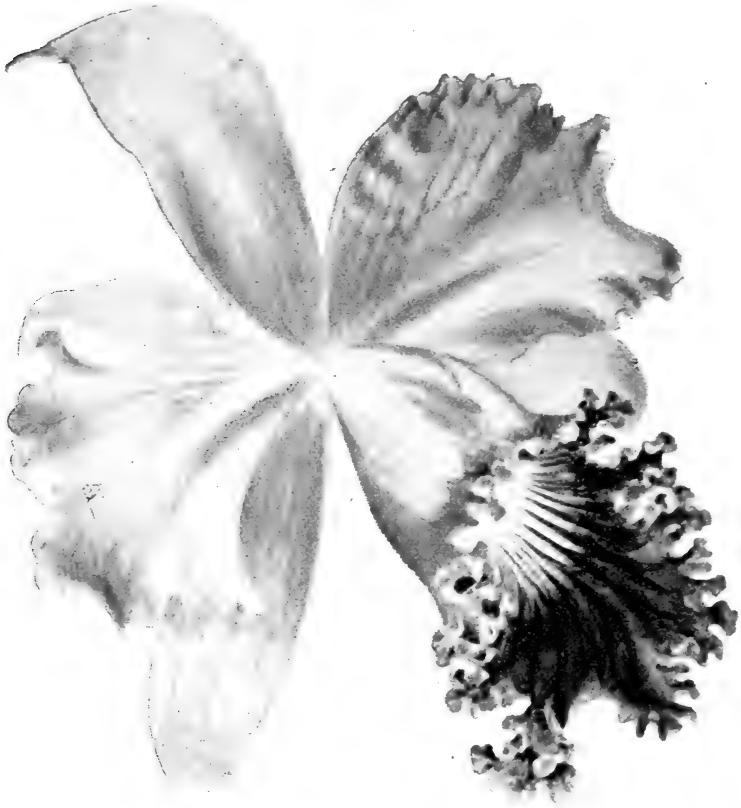


Fig. 203.—Lælio-Cattleya × 'Cassiope,' Westonbirt var. (*Journal of Horticulture.*)

Other Exhibits.

Messrs. Jas. Veitch, Chelsea, showed hybrid Orchids.

Francis Wellesley, Esq., Westfield (gr. Mr. Hopkins), showed two varieties of *Cypripedium insigne*.

R. I. Measures, Esq., Camberwell (gr. Mr. Smith), showed a yellow *Cypripedium insigne* raised from seed.

J. Wilson Potter, Esq., Croydon (gr. Mr. Young), sent *Zygopetalum Murrayanum*.

H. S. Leon, Esq., Bletchley Park (gr. Mr. Hislop), sent *Cattleya* × 'Comet' var. 'Audry' (*Warneri* × *Dowiana aurea*).

ORCHID COMMITTEE, DECEMBER 15, 1903.

Mr. H. J. VEITCH in the Chair, and twenty-three members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Baron Sir Henry Schröder, Bart. (gr. Mr. Ballantine), for group of Orchids containing many large specimens.

To Norman C. Cookson, Esq., Oakwood, Wylam-on-Tyne (gr. Mr. Chapman), for Cypripediums, forms of *Odontoglossum crispum*, &c.

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound), for Calanthes, Cypripediums, &c.

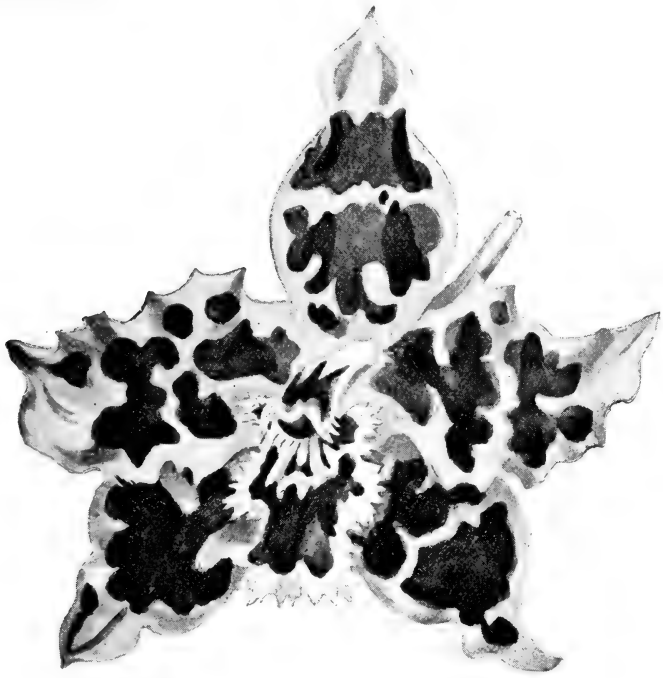


FIG. 204.—ODONTOGLOSSUM × VUYLSTEKEI VIVICANS. (*Journal of Horticulture.*)

Silver Flora Medal.

To G. F. Moore, Esq., Bourton-on-the-Water (gr. Mr. Page), for Cypripediums.

To O. O. Wrigley, Esq., Bury (gr. Mr. Rogers), for Cypripediums.

To W. E. Budgett, Esq., Henbury, Bristol for a collection of nearly two hundred specimens of Cypripediums.

To Messrs. Hugh Low, for a group of Orchids.

To Messrs. Jas. Veitch & Sons, for Lælio-Cattleyas, &c.

Silver Banksian Medal.

To Mr. Cypher, Cheltenham, for Cypripediums.

To Messrs. Williams, Holloway, for a group of Orchids.

To Mr. Whateley, Kenilworth, for Cypripediums and Odontoglossums.

First-class Certificate.

To *Odontoglossum* × *Vuylstekei vivicans* (? *triumphans* × *Wilckeanum albens*) (votes, unanimous), from Baron Sir H. Schröder. A fine hybrid with pale yellow sepals and petals heavily marked with red-purple, and white lip with one large and some smaller brown blotches. (Fig. 204.)

Award of Merit.

To *Cypripedium insigne Sanderæ* 'Oakwood Seedling' (votes, 13 for, 4 against), from Norman C. Cookson, Esq. A natural seedling raised at Oakwood. Dwarfer than the original, and with a yellow band dividing the basal green and the apical white of the dorsal sepal.

To *Odontoglossum crispum Mariæ* (votes, unanimous), from Norman C. Cookson, Esq. Flowers white, tinged with purple, and evenly blotched with red-brown.

To *Cypripedium* × *Leeanum Clinkaberryanum* (*Spicerianum* × *insigne* var.) (votes, unanimous), from Norman C. Cookson, Esq., Baron Schröder, and O. O. Wrigley, Esq. One of the best of its class. Flowers large, dorsal sepal white, with emerald-green base.

To *Odontoglossum* × *Harryano-crispum ridens* (*Harryanum* × *crispum*) (votes, unanimous), from Monsieur Vuylsteke, Ghent. A very large variety with cream-white flowers finely marked with rose-purple.

To *Cypripedium* × *nitens Wrigleyanum* (*villosum* × *insigne* var.) (votes, 13 for, 1 against), from O. O. Wrigley, Esq., Bury, Lancashire (gr. Mr. Rogers). Flowers greenish-yellow, the dorsal sepal profusely spotted with chocolate, and with a white tip.

Cultural Commendation.

To Mr. H. J. Chapman (gr. to Norman C. Cookson, Esq.), for *Cypripedium insigne Sanderæ* with ten flowers.

Other Exhibits.

Captain Holford, C.I.E. (gr. Mr. Alexander), sent Orchids.

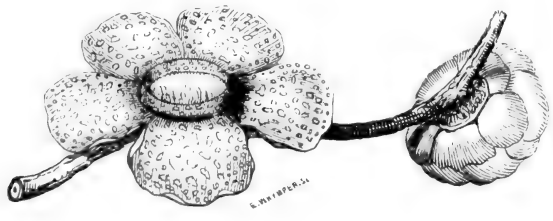
J. T. Bennett-Poë, Esq., V.M.H. (gr. Mr. Downes), sent *Cymbidium* × *Tracyano-giganteum.*

Mr. Tracy, Twickenham, showed *Cypripedium* × 'Chas. Canham' *aureum.*

W. M. Appleton, Esq., Weston-super-Mare, showed Cypripediums.

Lieut.-Col. Cary-Batten, Bristol, sent *Cypripedium* × 'Mrs. Cary-Batten.' Parentage unrecorded.

F. A. Rehder, Esq. (gr. Mr. Norris), showed *Cypripedium* × 'Zia' (*Exul* × 'Ianthe' *superbum*).



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LECTURES, MEETINGS, AND SHOWS

In the Society's Centennial Year, 1904.

Jan. 5. Exhibition and Meeting.
„ 26. Exhibition and Meeting. Lecture by Mr. H. Somers Rivers, on Oranges.
Feb. 9. ANNUAL GENERAL MEETING at 3 p.m.
23. Exhibition and Meeting. Lecture by Mr. R. Lewis Castle, on Pomology as a Study.
Mar. 8. Exhibition and Meeting. Lecture by Mr. Alex. Dean, on Cottage and Allotment Gardens.
„ 22. Exhibition and Meeting. Lecture by the Rev. Prof. Geo. Henslow, on Heredity of Acquired Characters.
April 5. Exhibition and Meeting. Lecture by Mr. Hugh P. C. Maule, on Design in the Suburban Garden.
„ 19. AURICULA AND PRIMULA SHOW. Lecture by Mr. George Massee, V.M.H., on Diseases of the Potato.
May 3. Exhibition and Meeting. Lecture by Monsieur Charles Baltet, on Enemies of the Apple Tree.
„ 17. TULIP SHOW AND MEETING. Lecture by Mr. R. Hedger Wallace, on the Horticultural Phase of Natural History.
May 31. } FLOWER SHOW, INNER TEMPLE GARDENS.
June 1. } Fellows admitted after 12.30 on May 31, upon showing their Tickets.
„ 2. }
„ 14. Exhibition and Meeting. Lecture by the Rev. Prof. Geo. Henslow, V.M.H., on Floral Metamorphoses.
„ 28. Exhibition and Meeting. Lecture by Monsieur Viviand-Morel, on Hybridisation of Roses.
July 12. } GREAT SUMMER SHOW AT HOLLAND HOUSE, KENSINGTON.
„ 13. } Fellows admitted after 12.30 on July 12, upon showing their Tickets.
„ 26. CARNATION AND PICOTEE SHOW. Lecture by Mr. John Bidgood, on Orchid Varieties and Hybrids.*
Aug. 9. Exhibition and Meeting. Lecture (not yet decided).
„ 23. Exhibition and Meeting. Lecture by Professor Boulger, M.A., on the Preservation of Wild Plants.
Sept. 6. Exhibition and Meeting. Lecture by Mr. J. W. Odell, on Gourds.*
„ 20. AUTUMN ROSE SHOW. Lecture by Mr. George Gordon, V.M.H., on Methods of employing Roses in the Decoration of Gardens.
Oct. 4. } BRITISH FRUIT SHOW in the Royal Hall, Vincent Square.
„ 5. } Meeting on October 4.
„ 6. }
„ 18. Exhibition and Meeting. Lecture by the Rev. Prof. Henslow, V.M.H., on Vegetable Sports.*
Nov. 1. Exhibition and Meeting. Lecture by the Hon. Vicary Gibbs, on Planting Woods for Winter Effects.
„ 15. Exhibition and Meeting. Lecture by Prof. Craig, on Orchard Management from a Commercial Standpoint.
„ 29. Exhibition and Meeting. Lecture by Mr. E. T. Cook, on Hollies.*
Dec. 13–14. Exhibition of Colonial Fruit and of Preserved Home-grown Fruit.

* Illustrated by lantern slides.

Note.—Unless otherwise stated, the Shows will be held for the first six months in the Drill Hall, Buckingham Gate; after June it is hoped that the Royal Horticultural Hall, Vincent Square, will be ready for use. Fellows admitted free at 1 p.m.; the public at 2 p.m. on payment of 2*s.* 6*d.*

FELLOWS' PRIVILEGES OF CHEMICAL ANALYSIS.

(Applicable only to the case of those Fellows who are not engaged in any Horticultural Trade, or in the manufacture or sale of any substance sent for Analysis.)

The Council have fixed the following rates of charges for Chemical Analysis to Fellows of the Society being *bonâ fide* Gardeners or Amateurs.

These privileges are applicable only when the Analyses are for *bonâ fide* horticultural purposes, and are required by Fellows for their own use and guidance in respect of gardens or orchards in their own occupation.

The analyses are given on the understanding that they are required for the individual and sole benefit of the Fellow applying for them, and must not be used for the information of other persons, or for commercial purposes.

Gardeners, when forwarding samples, are required to state the name of the Fellow on whose behalf they apply.

The analyses and reports may not be communicated to either vendor or manufacturer, except in cases of dispute.

When applying for an analysis, Fellows must be very particular to quote the number in the following schedule under which they wish it to be made.

No.		
1.	An opinion on the purity of bone-dust (each sample)	2*s.* 6*d.*
2.	An analysis of sulphate or muriate of ammonia, or of nitrate of soda, together with an opinion as to whether it be worth the price charged	5*s.*
3.	An analysis of guano, showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts and ammonia, together with an opinion as to whether it be worth the price charged	10*s.*
4.	An analysis of mineral superphosphate of lime for soluble phosphates only, together with an opinion as to whether it be worth the price charged	5*s.*
5.	An analysis of superphosphate of lime, dissolved bones, &c., showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime and ammonia, together with an opinion as to whether it be worth the price charged	10*s.*
6.	An analysis of bone-dust, basic slag, or any other ordinary artificial manure, together with an opinion as to whether it be worth the price charged	10*s.*
7.	Determination of potash in potash salts, compound manures, &c.	7*s.* 6*d.*
8.	An analysis of compound artificial manures, animal products, refuse substances used for manure, &c.	from 10*s.* to £1
9.	An analysis of limestone, showing the proportion of lime	7*s.* 6*d.*
10.	Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	10*s.*
11.	Complete analysis of a soil	£3
12.	Analysis of any vegetable product	10*s.*
13.	Determination of the "hardness" of a sample of water before and after boiling	5*s.*
14.	Analysis of water of land-drainage, and of water used for irrigation	£1
15.	Analysis of water used for domestic purposes	£1 10*s.*
16.	Consultation by letter	5*s.*

Letters and samples (postage and carriage prepaid) should be addressed to the Consulting Chemist, Dr. J. Augustus Voelcker, 22 Tudor Street, New Bridge Street, London, E.C.

The fees for analysis must be sent to the Consulting Chemist at the time of application.

Instructions for selecting, drawing, and sending samples for analysis will be found on pages 28–35 of "Arrangements, 1904," or can be obtained on application to the Society's Office, 117 Victoria Street, S.W.

ESTABLISHED 1804.

INCORPORATED 1809.

CENTENNIAL YEAR 1904.

NOTICES TO FELLOWS.

APRIL 1904.

NOTICES TO FELLOWS.

A few pages of Notices to Fellows are always added at the end of each number of the JOURNAL immediately preceding the Advertisements, and also at the beginning both of the "Book of Arrangements" and of the "Report of the Council." Fellows are particularly requested to consult these Notices as it would often save them and the Secretary much needless correspondence.

LETTERS.

All letters on *all* subjects should be addressed—The Secretary, Royal Horticultural Society, at 117 Victoria Street, Westminster, S.W., or after August 1, at Vincent Square, Westminster, S.W.

TELEGRAMS.

"HORTENSIA, LONDON," has been registered, and is sufficient address for all telegrams to the Society.

DISTRIBUTION OF PLANTS.

The Distribution has this year been carried out under the greatest possible difficulties, the Garden at Chiswick being entirely dismantled and the garden at Wisley not yet ready, and besides this, half the staff are in one place and half at the other. Fellows must make allowances for the difficulties entailed by moving, which affect the Society even more than they would an individual. The applications for plants are this year so numerous it is not certain whether it will be possible to satisfy all the requirements of the Fellows, although every effort will be made to do so. With the greater area and more suitable surroundings at Wisley, it is anticipated that the Gardens will in the course of a year or two be able to meet all the demands upon them, as they will then have had time to become definitely established (see also a note on p. 591).

Fellows are reminded that the work of the Gardens cannot be disorganised by the sending out of plants at other times than at the annual Distribution in March and April.

Moreover, plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country, and to make other horticultural enquiries on their behalf.

PLANTS FOR WISLEY.

The Society would be greatly obliged to any Fellows having choice hardy or Alpine plants if they would remember how acceptable they would prove at Wisley. Address,—Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey.

SUBSCRIPTIONS.

All Subscriptions fall due on January 1 of each year. To avoid the inconvenience of remembering this, 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. 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.

Several Fellows, in paying their Subscriptions, have made the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas and not Pounds.

CHANGES OF ADDRESS.

Fellows will greatly facilitate the work of the Society by immediately communicating to the Secretary any change in their address or any inaccuracy in the direction of the JOURNAL or other communications.

JOURNALS WANTED.

The Secretary would be very greatly obliged for any of the following back numbers:—Vol. VII., Part 2; Vol. VIII.; Vol. X.; Vol. XIII., Part 1; Vol. XVI., Parts 2 and 3; Vol. XVII., Parts 1 and 2; Vol. XVII., Parts 3 and 4; Vol. XIX., Part 1; Vol. XIX., Part 2; Vol. XX., Part 3; Vol. XXII., Part 3; Vol. XXII., Part 4; Vol. XXV., Part 3; Vol. XXVI., Part 4.

LECTURES.

Any Fellows willing to lecture or to contribute Papers on interesting subjects are requested to write at once to the Secretary.

THE CENTENARY,

1804-1904.

PATRONS.

All Fellows will be delighted to hear that His Majesty the King has graciously directed that, in honour of the Centenary, His Majesty's name should be added to that of the Queen as joint Patrons of our old Society.

THE SOCIETY.

THE PAST REVIEWED.—The Royal Horticultural Society has now been established exactly one hundred years, and on surveying the past century of its existence we are confident that it is in great measure due to the work done by the Society that British Gardening and Gardens now by universal admission take such a foremost place amongst the Horticulture of the whole world. It is unnecessary to dwell on the events and history of the past one hundred years, for these are all readily accessible in the JOURNAL of the Society and elsewhere. The Society has passed through many vicissitudes of fortune, it has had several homes and at least three other gardens, but never has it had such a home or such a garden as those into the possession of which it is now about to enter.

It should be specially noted that the Society has worked throughout the whole of its century of existence without any single subsidy whatever from Government or from any other public source, although much of its work has been, and is, of distinctly national character and advantage.

The Council believe that the Society is now entering on a period of peace and prosperity such as it has never known before, and that it has both a record in the past and a mission in the future of which any society may be most justly proud.

THE PRESENT POSITION.—The table on the next page will show at a glance the phenomenal growth of the Society since in 1887 it left South Kensington and reverted to its original purely horticultural policy and work.

Much still remains to be done, and the Council, whilst themselves doing their utmost, venture to call upon every Fellow also to do his best,

(1) To still further increase the Society's numbers,

(2) To help wipe out the debt on the Hall, and

(3) To provide a properly equipped Horticultural Research Station for the new Gardens at Wisley.

The last is a pressing want for British Horticulture generally, but the Council do not feel themselves justified in embarking on the expenditure it involves out of the Society's general income until the new Hall and its furniture are paid for entirely.

A complete list of the present Fellows up to December 31, 1903, was published in January last, from which Fellows will be able to see who of their acquaintance do not already belong to the Society; and forms of

proposal, perforated for tearing out, will be found between pages cclviii and cclix.

The Council recognise that it is very largely due to the individual efforts of the Fellows that they have been able to elect 2,500 new subscribers during the past two years, but they think that every use should be made of the present unique occasion of the Society's Centenary for still further increasing the Roll of the Fellows.

Of the now nearly 8,000 members about 1,200 have contributed to the building fund according to their means, but as all the Fellows will enjoy the more convenient and more spacious Exhibition Hall, Lecture Room, and Library, the Council trust that all who have not yet sent a contribution will now do so, in order that it may indeed be the Hall of the whole Society and not of a certain number of the Fellows only. Let there not be one single Fellow when the Hall is opened who cannot say he has done his share (no matter how small) towards the cost of its erection, even though he may have paid for but a few bricks in the foundation.

Year	Expenditure	Annual Increase or Decrease of Expenditure	Income	Annual Increase or Decrease of Income	Investments *	Annual Increase of Investments	Year
	£	£	£	£	£	£	
1887	3,577	—	2,894	—	Debt −1,152	—	1887
1888	3,412	−165	3,617	+723	—		1888
1889	3,960	+548	3,520	−97	—	Debt paid off	1889
1890	3,866	−94	4,102	+582	—		1890
1891	4,182	+316	4,439	+337	—		1891
1892	4,872	+690	4,873	+434	479	+479	1892
1893	5,193	+321	5,591	+718	479	—	1893
1894	5,076	−117	5,550	−41	975	+496	1894
1895	5,073	−3	5,638	+88	1,768	+793	1895
1896	5,788	+715	5,944	+306	2,325	+557	1896
1897	5,481	−307	6,303	+359	2,325	—	1897
1898	5,810	+329	7,104	+801	3,691	+1,366	1898
1899	6,069	+259	7,820	+716	6,154	+2,463	1899
1900	6,553	+484	8,193	+373	8,156	+2,002	1900
1901	7,061	+508	9,312	+1,119	11,237	+3,081	1901
1902	8,236	+1,175	10,724	+1,412	13,737	+2,500	1902
1903	8,776	+540	12,418	+1,694	16,536	+2,799	1903

* The Davis and Parry Legacies, amounting to £2,022, are not included in the investments in this table, as they have no bearing on the fluctuations of the Society's financial position.

Future Prospects.—When we look back over the past century and see the wonderful changes it has introduced in every branch of horticulture, as in everything else, we hesitate to forecast what improvements may not be made in even a few years to come, both in plants themselves and in gardening appliances and operations. Hybridisation will no doubt play the foremost part in the immediate future, but to make full gain of all its wondrous possibilities, its laws require to be more fully studied and made known. Electricity, also, will possibly be gradually applied in many ways; and almost all the natural laws and phenomena of plant-life have to be still further investigated, and other such useful work to be done. None of these questions can be adequately dealt with without the establishment of a really scientific Research Station in connection with the gardens at Wisley, where experiments can be made and carried on side

by side in the laboratory and in the gardens. The Council have decided to proceed with this work as soon as the new Hall is paid for, and the finances satisfactorily adjusted, but they do not feel justified in embarking on it so long as the present liabilities remain undischarged. Donations to either, *or both*, of these objects will be gratefully received, and the Council appeal to all the Fellows to rally round them, and each and every one to do his utmost to give the grand old Society a splendid start into the second century of its work and usefulness.

Every one who has a garden or who is interested in horticulture should belong to the Society, and were the privileges of Fellows more widely known, hundreds of new subscribers would probably give their support. The Council appeal therefore to each individual Fellow to do his utmost to clear off the balance due upon the Hall, to assist in providing the new scientific station at Wisley, and to make the work and advantages of the Society known to all his horticultural friends who are not Fellows already. Forms of Proposal and List of Privileges, perforated for tearing out, will be found between pages cclviii and cclix.

As each year goes on more and more public work is taken up by the Society, more societies are affiliated, more awards are made, the shows increase in size, are more largely attended, and more publications are issued—all which, of course, means the need of more funds.

THE NEW HALL AND OFFICES.

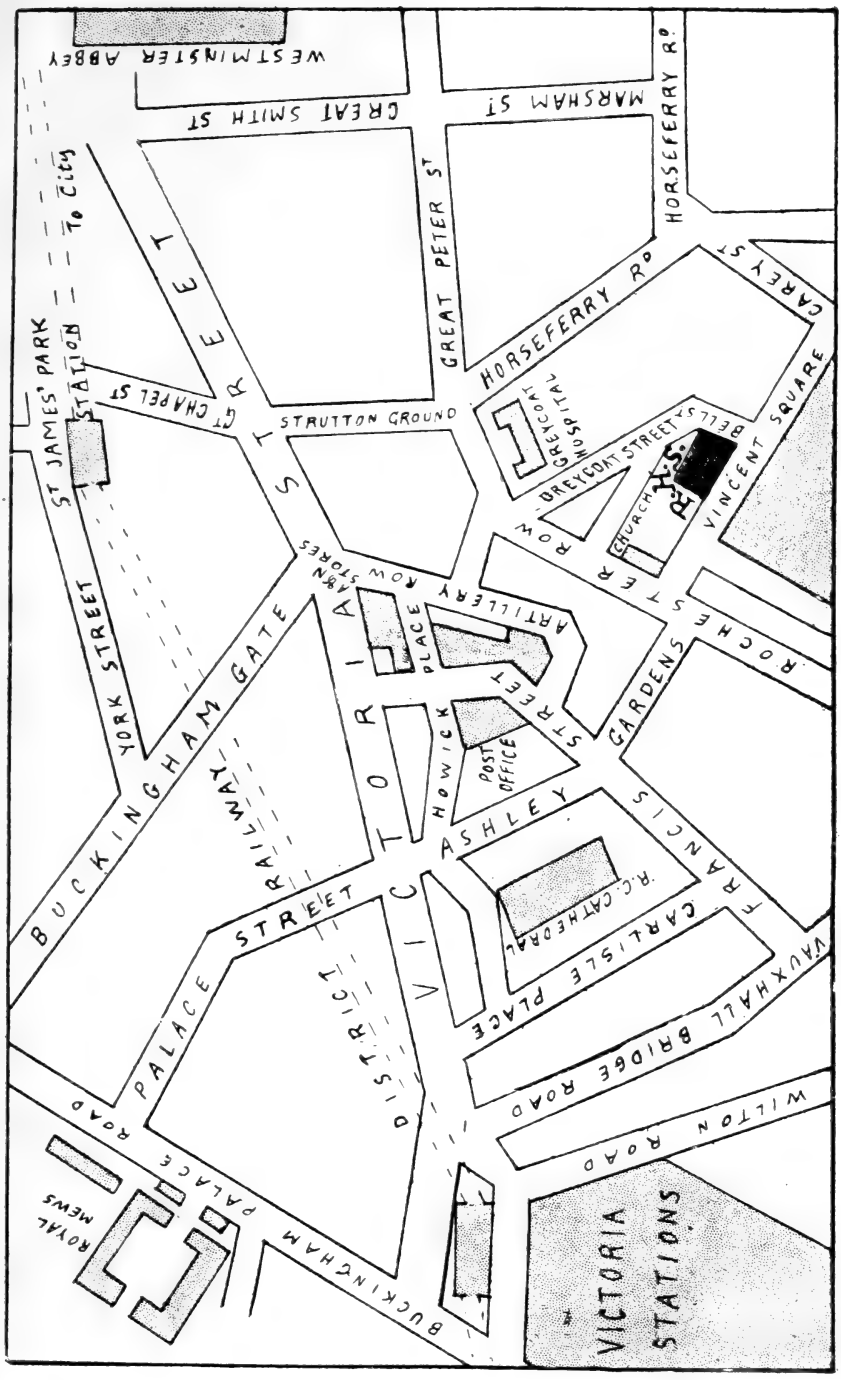
The New Hall, which is to be called "The Royal Horticultural Hall," measures 142 × 75 feet, which with the two Annexes opening into it, each 47 × 24 feet, gives a total floor space of nearly 13,000 superficial feet for the purposes of the Society's fortnightly and other shows. This, compared with the 7,000 feet available at the present Drill Hall, shows that the frequent disappointment experienced in the past, of exhibits not being able to be staged for lack of room, will be almost, if not entirely, removed. It must also be remembered that a large proportion of the Drill Hall space is now taken up with entrance and lecture accommodation, both of which in Vincent Square are separately provided for. The Hall itself is lighted by a roof entirely of glass, and the Annexes are lighted both from it and by the large round-headed windows seen on the ground floor of the front elevation.

The main entrance for visitors is by the door in the centre facing Vincent Square, and for plants the door is at the end of the Hall abutting on Bell Street, but there are subsidiary entrances and exits, one out of each Annexe and one on each side of the plant entrance.

In addition to the main entrance in the centre and the two entrances through the Annexes, there are in the front of the building two more entrances, which can be used as emergency exits. One of the two additional entrances leads to the stairs and lift up to the Library and Offices, and the other to the Lecture Room.

The Exhibition Hall and the entire building are heated by radiators, and lighted by electricity for evening meetings.

The Lecture Room occupies the whole of the east wing on the first floor. It has a separate staircase and entrance for convenience of access



POSITION OF THE ROYAL HORTICULTURAL HALL.

and for letting purposes, and is being fitted with an electrical lantern which will include all the most recent improvements. Anyone willing to make a special donation could not do better than present the Society with a good microscope suited to scientific work, and so supply a want long felt by the Secretary and by the Scientific Committee.

The three Committee rooms occupy the west wing of this floor and will also be available for the meetings of other societies.

Other Accommodation.—The east wing of the second floor will be devoted to the administrative work of the Society. This will include the Council room, Secretary's and clerks' offices, waiting room, &c. There are cloak rooms and lavatories for both ladies and gentlemen in the basement, quite separate from those for the use of the staff. The caretaker's rooms are on the third floor, in the centre above the offices.

Access.—Vincent Square lies just behind the Army and Navy Stores in Victoria Street, Westminster, and is only five minutes' walk from the present Drill Hall. It is exactly midway between Westminster Abbey and Victoria Station and is most accessible from all parts of London. The nearest railway stations are Victoria and St. James's Park.

Letting.—The Council have already taken out the necessary licence, and when not being used by the Society they are prepared to let the Hall, the Council, Committee, and Lecture Rooms to other societies, for shows and exhibitions, and for entertainments, bazaars, concerts, and the like. Particulars of terms, dates, &c., and conditions of letting, can be had on application to the Secretary. The Council particularly ask all Fellows to make it as widely known as possible what spacious and convenient premises they have for letting, as to that source of income they look to maintain a material part of the annual expense of the upkeep of the building.

The Library.—The west wing of the second floor will be devoted to the purpose of worthily housing the Library of the Society, with which is included the incomparable collection of horticultural works known as the "Lindley Library." The room will be lighted with three sets of lights on either side and by transmitted light from the north side of the ceiling. The book space available will be at least double what it now is in Victoria Street, and the Council appeal to the Fellows to give copies of all books, pamphlets, and articles on horticultural subjects which they may write at any time and to send presents of other books, whether duplicates from their own library or otherwise, so that the Society's Library may still worthily rank at the head of such institutions in the future, as it has long done in the past.

Date of Moving.—The first of the fortnightly shows to be held in the Royal Horticultural Hall is fixed to take place on Tuesday, July 26, and after that date all the Society's work will be conducted from Vincent Square instead of Victoria Street. Fellows are therefore requested to note the change in the address. The telegraphic address will still be "Hortensia, London," and the telephone will be installed as soon as the change of quarters actually takes place.

THE CHISWICK GARDENS.

RETROSPECTIVE.—The Society has throughout its history always been most fortunate in its practical gardens, especially those at Chiswick, which it has occupied for more than eighty years. Originally of some thirty-two acres in extent, the gardens were among the first and best of their kind in the early part of the last century. Here were propagated the plants sent home by the Society's collectors from North America, China, Japan, and South Africa, and hitherto unknown in this country, seeds and cuttings from which were distributed among the Fellows, and through them to the country at large. Besides the many new flowers, shrubs, and trees thus obtained, much practical work and experiments of great and permanent value to the horticulturists of the land were carried out. Some years ago the extent of the Garden was reduced (by the compulsory sacrifice of the grand Arboretum) to about thirteen acres, and the overdraining, and the smoke-laden atmosphere from the surrounding houses and factories, have in recent years greatly hindered the development of the Society's practical work. When, therefore, Sir Thomas Hanbury so generously offered to purchase the late Mr. G. F. Wilson's garden and land at Wisley for the Society's purposes, his munificent offer was most gratefully accepted, much as the older members of the Society must naturally regret leaving the old garden home.

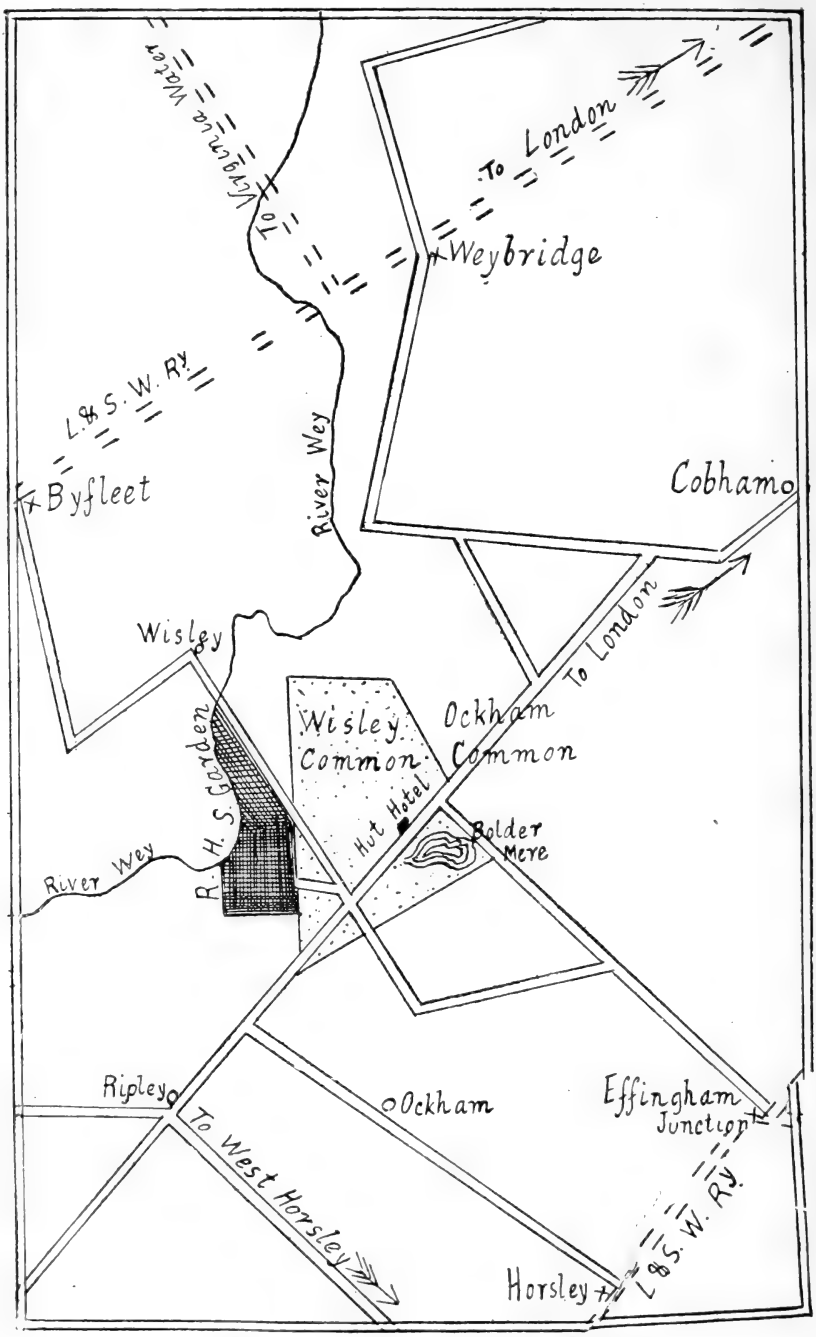
THE WISLEY GARDENS.

ACCESS.—As announced in the "Arrangements for 1904," Fellows are now free to visit the Gardens, each Fellow's "Personal Pass" admitting himself and two friends, and each "Transferable Ticket" admitting three persons (see note on page 594). Fellows, however, are particularly asked and advised not to go down to the Gardens until after May 1, as it has been found impossible to remove the whole staff from Chiswick till then, and Mr. Wright, the Superintendent, is not yet at Wisley to show Fellows round and to point out plants of special value or interest.

The gates will be opened at 9 A.M. and closed at sunset. The Gardens will be closed on Christmas Day, Good Friday, and on all Sundays, but not on Bank Holidays.

The Gardens are situated about 2 miles from Ripley; and about 3½ miles from Horsley and 5½ miles from Weybridge, both stations on the South Western Railway, with frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. White, the proprietor, Ripley, Surrey; the charge being to and from Weybridge 10*s.*, or to and from Horsley 7*s.* Excellent accommodation and refreshments can be had at the Hut Hotel, close to the Garden.

OBJECTS.—The Gardens are at present under construction, but will be devoted to the culture of Fruits, Vegetables, stove, greenhouse, and especially hardy Flowers and Plants, Trees, Shrubs, &c. Experiments and trials will be made in connection with new and rare varieties of trees, shrubs, fruits, flowers, or vegetables, and the results will be published in the Society's JOURNAL.



POSITION OF THE SOCIETY'S GARDEN.

The Council are anxious to make the Gardens (so far as the funds at their command will allow) a School of Practical and Scientific Horticulture, and of increased value and interest to the Fellows. Mr. Wilson's wild garden will be carefully preserved and continued, whilst other parts of the site will be devoted to the cultivation of all such trees, shrubs, fruits, vegetables, stove, greenhouse and hardy plants and flowers as are found to be most generally useful or ornamental; to the trial of new varieties side by side with old established ones; to the hybridisation of Plants and the raising of New Varieties; to experiments in the culture and treatment of those plants which possess a floral or decorative as distinguished from a merely botanical value and interest. To these may be added the trial of such Horticultural appliances and materials as may from time to time be submitted; and if funds be forthcoming it is hoped to add a practical Scientific department, with Laboratory, &c.; this, however, will largely depend on the liberality of Fellows interested in scientific research.

The cultivation, trial, &c., of Fruits has always been considered as of the utmost importance, and will form one of the most valuable features of the Gardens. It is intended to establish and maintain a collection of all the best varieties of fruits, and extend it from time to time by the trial of such novelties as the raisers may be good enough to bestow on the Society.

A collection of standard and typical varieties of different Vegetables will also be grown for comparison with new varieties, both to assist the Committee in recommending their awards and for the general information of the Fellows. Besides this general collection, specially exhaustive trials of certain classes of fruits, flowers, and vegetables will be made every few years in rotation, and descriptive reports given in the Society's JOURNAL.

The Floral department will include trees, shrubs, plants, and flowers of a distinctly decorative garden character, whether for cultivation under glass or out of doors. A few classes only can be illustrated each year.

The Officials of the Society will give any information and render every assistance in their power to all Fellows. Anyone wishing to study any particular branch of gardening operations, or to make any special observations on different subjects, should make direct application to the Secretary, 117 Victoria Street, Westminster, or after July, Vincent Square, S.W.

STUDENTS.—Students will be admitted to the Gardens at Wisley on the same terms as at Chiswick in recent years: namely, that each student on being accepted shall pay a fee of £5 5*s.* and undertake to remain for two years at least at the Gardens. During this period every student will be carefully trained in practical horticulture both in the open and under glass, including the cultivation of flowers, fruits, and vegetables; some of them will also be permitted to attend the Society's lectures and shows in the new Hall and elsewhere. A small horticultural library is attached to the Gardens for their use. Every opportunity is given to students who use application, to master the whole of the general subject of practical horticulture, and as soon as a scientific department can be established, no doubt elementary science as it affects horticulture will be added to the curriculum.

The Council find that there is generally more demand for those who have been trained at the Society's gardens than there are students to satisfy the inquiries.

Scientific Work.—Reference has already been made above to the Council's intention to start a scientific station at Wisley so soon as the new Hall has been paid for, and the more general work of the Gardens organised. The *initial* cost of the laboratory and other buildings, and of the necessary instruments, can hardly be far short of £1,500 or £2,000, and the *annual* expense for salaries and general upkeep would be at least £500 a year. It is confidently hoped that the Horticultural Research Station will be the pioneer of many such centres of study and investigation throughout the country. The students being trained in the Gardens will also in due time thus have the additional advantage of an insight into the methods of modern scientific research. The many problems in plant-breeding, in the treatment and investigation of plant diseases, and in hybridisation, will be approached in time from every side, and the application of gases, of electricity, and of various chemical agents will be both practically and scientifically demonstrated. (See also page cxxxi.)

Meteorology.—Scientific meteorological work has already been begun at Wisley, and the observing station in the Gardens bids fair to rank as one of the best in the kingdom.

The instruments in use are as follows :

1. A standard maximum thermometer, Negretti pattern.
2. A standard minimum thermometer, Rutherford pattern.
3. A psychrometer—dry and wet bulb standard thermometers.
4. Three soil thermometers, Symons's pattern.
   (*a*) One at 1 foot deep.
   (*b*) One at 2 feet deep.
   (*c*) One at 4 feet deep.
5. Two terrestrial radiation minimum thermometers with cylindrical bulbs.
6. A stout eight-inch copper rain-gauge, Meteorological Office pattern.
7. A Campbell-Stokes sunshine recorder, new Meteorological Office pattern.

The thermometer screen is a "Stevenson," Royal Meteorological Society's pattern.

All the thermometers have certificates from the Kew Observatory, giving their errors at all parts of the scale, and the whole station has been placed under the inspection of, and is being worked in co-operation with, the Government Meteorological Office.

THE JOURNAL.

The present issue of the Journal completes the seventeenth volume which the Society has published since the great revival in 1887. The earliest volumes published were issued in quarto size and called "Transactions," and were illustrated with magnificent coloured plates which cannot be surpassed even at the present day. The first series of these "Transactions" was published between 1805 and 1830, and the

second series appeared from 1831 to 1848. They were issued in half-yearly parts. There are ten volumes of these "Transactions" in all.

The "Journal" was first published in 8vo form in 1845 and was issued very spasmodically up to the year 1889, but since then one volume has been published annually, and in some years two have been issued, and it now ranks as the finest Horticultural Journal in the world, is much sought after by kindred scientific societies on the Continent of Europe and in America, and forms the most valued privilege of the Fellows of the Society.

EXAMINATIONS.

1. The Society's 12th Annual Examination in the PRINCIPLES AND PRACTICE OF HORTICULTURE was held on Wednesday, April 20, 1904, the entries for which closed on March 1. It is proposed to hold a similar examination in 1905, particulars of which may be obtained by sending a stamped and directed envelope to the Society's offices. Copies of the questions set from 1893 to 1903 (price 1*s.* a set, or 5*s.* a dozen sets) may also be obtained from the office. The Society is willing to hold an examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

2. The Society will also hold an Examination in COTTAGE GARDENING on Tuesday, June 21, 1904. This examination is intended for, and will be confined to, Elementary School Teachers. It has been undertaken for the first time this year in view of the increasing demand in country districts that the schoolmaster shall be competent to teach the elements of Cottage Gardening, and the absence at present of any test whatever of such competence. The general conduct of this examination will be on similar lines to that of the more general examination. The entries will close on May 1, 1904.

THE TEMPLE SHOW.

The seventeenth great annual Flower Show in the Inner Temple Gardens, Thames Embankment, will be held, by the kind permission of the Treasurer and Benchers of the Inner Temple, on Tuesday, Wednesday, and Thursday, May 31, and June 1 and 2.

As on previous occasions, a large number of Silver Cups and Medals will be awarded according to merit, and besides these three Special Prizes will this year be awarded for the exercise of good taste in the arrangement of exhibits. These three prizes will be awarded without any reference to the quantity or quality of the exhibit, and will be in addition to any other award that may be gained. The VEITCHIAN CUP, value 55 guineas, will also be awarded on this occasion (see "Arrangements, 1904," p. 60).

Fellows of the Society are admitted free on **showing their Tickets.** N.B.—Each Personal Pass is strictly non-transferable and will only admit the Fellow to whom it belongs, but no one else (see p. 594). Fellows'

Transferable Tickets are available for themselves or a friend. The general public are admitted by purchased Tickets:—On Tuesday, May 31, from 12.30 to 7 p.m., 7*s.* 6*d.* On Wednesday, from 9 a.m. to 7 p.m., 2*s.* 6*d.* On Thursday, from 9 a.m. to 6 p.m., 1*s.*

To avoid the inconvenience of crowding, Tickets may be obtained beforehand at the Society's Office, 117 Victoria Street, S.W.

The Society's Offices at Westminster will be closed on the days of the Show, and consequently no letters should be addressed there on the previous day.

On the days of the Show, Tickets will only be on sale near the entrance to the Gardens (Thames Embankment Gate).

Members of Affiliated Societies, and *bonâ-fide* Gardeners, may obtain 2*s.* 6*d.* Tickets for 1*s.*, which will admit them to the exhibition on Wednesday. Members of Affiliated Societies *must* apply *only through the Secretary of their own* Society if they wish to take advantage of this privilege. These tickets *can only be obtained* on or before May 28 *from the Society's Office*, 117 Victoria Street, S.W., and a large stamped and directed envelope must be sent with Postal Order in every case.

HOLLAND HOUSE SHOW.

The third great annual Flower Show at Holland House, Kensington, will be held, by the kind permission of the Earl of Ilchester, on Tuesday and Wednesday, July 12 and 13. This meeting will be on similar lines to the Temple Show, and all classes of Plants, Flowers, and Fruits may be exhibited. There will also be a tent as last year for "Sundries." Application for space must be made to the Secretary, 117 Victoria Street, not later than Tuesday, July 5. Single Plants, Flowers, Fruits, &c., shown for Certificate, may be entered on the Morning of the Show, but only before 10.30 a.m.

Special prizes are offered for Representative groups of Roses (The Sherwood Cup) in a space of 500 square feet, and also for Flowers and Foliage arranged in vases or other vessels (see "Arrangements, 1904," p. 78).

The Show will be open to Fellows **showing their Tickets**, and to others showing Fellows' Transferable Tickets, at 12.30 p.m. on Tuesday, July 12, and at 9.30 a.m. on Wednesday, July 13. N.B.—Fellows' Annual Tickets must be shown at the Gates and other Tickets given up. The public will be admitted on Tuesday the 12th, at 2 p.m., on payment of 7*s.* 6*d.*, and at 9.30 a.m. on Wednesday on payment of 2*s.* 6*d.* The Grounds will be cleared of visitors at 8 p.m. on Tuesday, and 6 p.m. on Wednesday, when exhibits may be removed. A Fellow's Personal Pass only admits the actual Fellow himself (see page 594).

The ONLY ENTRANCE to the Show will be by the Great Gate in Kensington High Street, and the ONLY EXIT by the Gate leading into Melbury Road, where carriages may be ordered to wait.

To avoid crowding at the Gate the Public are earnestly requested to obtain their Tickets on or before Monday, July the 11th, at the Society's Office, 117 Victoria Street, S.W.

Note.—KENSINGTON HIGH STREET is the nearest Station on the Metro-

politan and District Railways from Liverpool Street, King's Cross, St. Pancras, Euston, Paddington, Cannon Street, Charing Cross, and Victoria.

Addison Road is the nearest from Waterloo, Clapham Junction, Willesden, and Richmond.

Earl's Court is the nearest from Wimbledon, Putney, Fulham, Acton, Ealing, and Windsor. It is convenient to change at Earl's Court for Kensington High Street.

Notting Hill Gate is the nearest Central London Electric (Tube) Station, and from thence Omnibuses pass the gates.

All Hammersmith and Turnham Green Omnibuses pass the gates, from Liverpool Street, Bank, King's Cross, St. Pancras, Euston, Charing Cross, and Hammersmith.

AUTUMN ROSE SHOW.

A special Show of Autumn blooming Roses will be held in conjunction with the National Rose Society in the Royal Horticultural Hall, Vincent Square, Westminster, on Tuesday, September 20. Gold Medals, Silver Cups and Medals, and money prizes in abundance are offered.

Fellows' Passes and Transferable Tickets will be admitted free at 1 p.m., and the Public at 2 p.m. on payment of 2*s.* 6*d.*

The Schedule can now be obtained from the Society's Office by enclosing one penny stamp.

BRITISH-GROWN FRUIT SHOW.

A great Show of British-grown Fruit will be held in the Royal Horticultural Hall, Vincent Square, S.W., on October 4, 5, and 6. Fellows' Passes and Transferable Tickets will be admitted at 12 o'clock on October 4, and at 10 a.m. on the other two days. Admission to the public: From 1 to 7 p.m. on October 4, on payment of 2*s.* 6*d.*, after 7 p.m. 1*s.*, and at 10 a.m. on the other two days, on payment of 1*s.* The Show will remain open until 10 p.m. on the 4th and 5th, but closes at 6 p.m. on October 6.

The Council have consented to this Exhibition on condition that those interested in the promotion of British Fruit-growing would combine to subscribe a sum of not less than £200 towards the Prize money and general expenses, which are estimated at a cost of £350 or £400. It cannot be too widely known amongst Fruit-growers that the Royal Horticultural Society is perfectly willing to undertake the work of such a show as the present, and to bear some part of the expenditure, but the Council cannot undertake the *whole* cost; the prospect, therefore, of such Annual Shows in the future depends mainly on those interested in the matter uniting to help with the funds.

The Schedule of Prizes can be obtained at the Society's Office, 117 Victoria Street, S.W., by enclosing one penny stamp.

SHOW OF COLONIAL-GROWN FRUIT

WITH

BRITISH AND FOREIGN PRESERVED OR DRIED FRUITS.

On December 13 and 14 there will be a Show specially of Fruit grown in British Colonies, but with it will be several classes for Home-grown, Colonial, and Foreign Preserved, Bottled, or Dried Fruits, Jams, &c. The Schedule of Prizes can be obtained at the Society's Office, 117 Victoria Street, by enclosing one penny stamp.

Fellows' Passes and Transferable Tickets will be admitted at 1 p.m. on the 13th, and at 10 a.m. on the 14th; the Public from 2 to 7 p.m. on the 13th on payment of 2*s.* 6*d.*, after 7 p.m. 1*s.*; and at 10 a.m. on the 14th on payment of 1*s.* The Show will remain open till 10 p.m. on both days.

As the object of the Exhibition is to prove what grand Fruits can be had without going outside the Greater Britain, it is hoped the growers of Fruits in the Colonies will all endeavour to send of their best. Fruit intended for this Show can, if necessary, be consigned to the Secretary, Royal Horticultural Hall, Vincent Square, London, S.W., when it will be stored in the vaults under the Hall till December 12, and the Society's officers will stage it. No Fruit sent in this way can be repacked for return.

All staging must be finished before 4 p.m. on Monday, December 12, as there will be a private Press view at 5 p.m. on that day. Exhibitors must clear their goods away before noon on December 15.

AFFILIATED SOCIETIES.

A very pleasant surprise was experienced one raw March morning on opening a letter and finding a cheque for £8 8*s.* sent as a donation by the Ware and District Horticultural Mutual Improvement Society, the Secretary, Mr. George Gumbrell, writing that it was a donation from his Society towards the Royal Horticultural Hall. It is very delightful to find an Affiliated Society sympathising thus with the old parent Society, and we hope others will be led in this good and helpful way by the example of the Ware and District Society. There is ample need of a similar donation from every one of them.

ASSISTANT SECRETARY.

As stated by the President at the Annual Meeting of the Society on February 9 last, the business of the Society has of late years increased so largely that it has become necessary to appoint an Assistant Secretary to help deal with the additional work. The Council therefore unanimously appointed Mr. Tom E. Sedgwick to the post.

HISTORY OF THE SOCIETY.

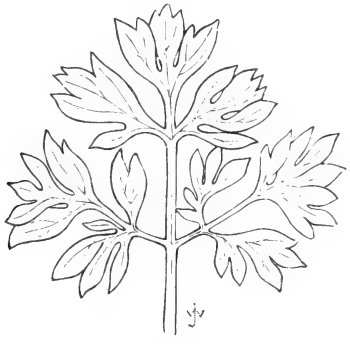
The Council have decided to publish a short Centennial History of the Society, giving an account of its many and varied efforts for the general encouragement of horticulture, both useful and ornamental, during the past one hundred years, and including descriptions of its gardens, and other homes, its shows, publications, &c., and of the variety of work which it has performed during that period. Anyone who has not studied the subject can have no conception of the vast and rapid changes which have taken place in every branch of horticulture since the Society was founded in 1804, nor of how largely these are due to the efforts of the Society, now celebrating its centennial year. Not only have gardens become more general, and better cared for, but every class of garden produce has been enormously improved and vast numbers of new flowers, plants, trees, fruits and vegetables have been added to our possession. The Society has all along been the pioneer institution of its kind in the whole world, and the Council feel that it is only due to the memory of those now gone from us, whose labours have resulted in the practical success and pre-eminence of our Society, that some record should appear at the present auspicious time.

The history will consist of about 150 pages, including the appendices, and will be illustrated by a series of full-page illustrations, specially prepared for the purpose. It will probably be sold at about 3*s.* 6*d.* a copy, bound in cloth, with coloured edges, or in paper covers 1*s.* 6*d.*

Any Fellow having copies of old programmes, notices, almanacs, plans, or other matter relating to the subject, whether published by the Society or otherwise, will greatly assist in the compilation if he will lend them to the Society for a few weeks. The greatest possible care will be taken of such documents, and they will be returned as soon as possible.

ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited. An Index to the Advertisements will be found on pages 34 and 35.



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INDEX No. II.

FUNGOID PESTS OF THE ORCHARD, FRUIT GARDEN, VINERY AND STOVE

IN VOL. XXVIII.

BY M. C. COOKE, M.A., LL.D., V.M.H., A.L.S., F.R.H.S.

This Index has been most kindly compiled by Mrs. A. Stuart, F.R.H.S.

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